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Sent: Wednesday, September 12, 2018 7:28 AM

To: Liscio, Matthew P CIV SEA 04, NAVSEA DET RASO [matthew.liscio@navy.mil]

CC: Howard, Leslie A CIV NAVFAC SW [leslie.howard@navy.mil]; Fowler, Janet CIV NAVSEA, SEA 04N [janet.fowler1@navy.mil]; Johnson, Nels [Nels.Johnson@aptim.com]; Schul, Raymond [raymond.schul@aptim.com]; Guillory, Jeffrey [jeffrey.guillory@aptim.com]; Amy Mangel [amy.mangel@aptim.com]; Hanelt, Norm [Norm.Hanelt@aptim.com]; Killpack, Randall [randall.killpack@aptim.com]; Chi, Minhsec [minhsec.chi@aptim.com]; Orman, Sean [sean.orman@aptim.com]; Rogers, Bryon [bryon.rogers@aptim.com]

Subject: [Non-DoD Source] Data package ready for review - HPNS PE-2, RSY B1 (DC)

Attachments: HPNS APTIM RSY B1 (DC) Soil Non-LLRW Concurrence Request 09122018 (reduced).pdf

Mr. Liscio,

APTIM request RASO concurrence to designate this soil as Non-LLRW soil.

If there are any questions or if additional data is required, please contact me.

Thank you.

LAURA WHITTAKER

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Hunters Point Naval Shipyard, Parcel E-2 RSY Data Report

Contract No. EMAC III CTO-0013		
RSY Pad: B1	RSY Pad Use Number: Deconstruction (DC)	First Submittal <input checked="" type="checkbox"/> Second Submittal <input type="checkbox"/>
Data attached and submitted by: Laura Whittaker		Data Report Submittal Date: 09/12/2018

Soil Sample Data					
Sample Identification	Survey Location	Type of Sample	²²⁶ Ra Final Analytical Results (pCi/g)	¹³⁷ Cs Final Analytical Results (pCi/g)	Total Sr Final Analytical Results (pCi/g)
Upper limit of site reference background			1.633	0.113	0.331
PE2-RSYB1-DC-S001	1	Systematic	0.676	-0.0214	-0.0133
PE2-RSYB1-DC-S002	2	Systematic	0.546	-0.00197	N/A
PE2-RSYB1-DC-S003	3	Systematic	0.655	-0.0304	N/A
PE2-RSYB1-DC-S004	4	Systematic	0.631	0.0258	N/A
PE2-RSYB1-DC-S005	5	Systematic	0.712	-0.0439	N/A
PE2-RSYB1-DC-S006	6	Systematic	0.759	0.0135	N/A
PE2-RSYB1-DC-S007	7	Systematic	0.596	0.000	N/A
PE2-RSYB1-DC-S008	8	Systematic	0.642	0.00703	N/A
PE2-RSYB1-DC-S009	9	Systematic	0.813	-0.0574	N/A
PE2-RSYB1-DC-S010	10	Systematic	0.499	0.0170	N/A
PE2-RSYB1-DC-S011	11	Systematic	0.662	0.0286	0.0379
PE2-RSYB1-DC-S012	12	Systematic	0.639	0.0305	N/A
PE2-RSYB1-DC-S013	13	Systematic	0.862	-0.0318	N/A
PE2-RSYB1-DC-S014	14	Systematic	0.665	-0.0189	N/A
PE2-RSYB1-DC-S015	15	Systematic	0.799	0.0106	N/A
PE2-RSYB1-DC-S016	16	Systematic	0.764	-0.00377	N/A
PE2-RSYB1-DC-S017	17	Systematic	0.454	-0.0526	N/A
PE2-RSYB1-DC-S018	18	Systematic	0.734	-0.00317	N/A
Biased Soil Sample Data					
PE2-RSYB1-DC-B-S001	1	Biased	0.613	-0.0651	N/A

²²⁶Ra Radium-226
¹³⁷Cs Cesium-137
 Sr Strontium
 pCi/g Picocuries per gram

Instrument and Survey Data										
Activity	Survey #	Date	Meter	Calibration Due Date	Serial #	Reference Area Static Bkgd	Reference Area Static 3σ IL	Reference Area Scan Bkgd	Reference Area Scan 3σ IL	Range
RSI Gamma Walkover Survey	HPRS-07202018-PE2-ROV2-2805	07/20/2018	RS-701/RSX-1	N/A	Console: 7236 Detectors: 5447,5448	N/A	N/A	3,400 CPS	4,872 CPS	3,318-4,913 ⁺ CPS
RSI Follow-up Static Survey	HPRS-07302018-PE2-JSS2-2848	07/30/2018	RS-701/RSX-1	N/A	Console: 7236 Detectors: 5447,5448	3,612 CPS	4,255 CPS	N/A	N/A	4,022-4,714 ⁺ CPS
Systematic Sample Survey	HPRS-08022018-PE2-JSS-2900	08/02/2018	2221	06/29/2019	117634	15,069 CPM	17,241 CPM	N/A	N/A	14,865-19,093 ⁺ CPM
Biased Sample Survey	HPRS-08022018-PE2-JSS-2877	08/02/2018	2221	06/29/2019	117634	15,069 CPM	17,241 CPM	N/A	N/A	21,298 ⁺ CPM

+ Gamma readings exceeding the Reference Area 3σ IL are attributable to the presence of naturally-occurring non-Navy program radionuclides in the excavated soil—see Note(s) in the Summary table (page 2) for more details.

3σ IL Investigation Level (established at 3σ above the mean of the Reference Area dataset)

CPS Counts per second

CPM Counts per minute

Summary

1) RSI gamma walkover survey and data review—upon review of initial scan data, follow-up static investigations were deemed necessary, and investigation locations were identified as per the RSI Data Evaluation Process (pages 3-4). Gamma scan coverage is shown on the Systematic Sample Survey map (page 8). Contour maps of scan data are shown on RSI Data Plots (page 5). Data review results are summarized on RSI Review Summary (page 6).

RSI Follow-up static survey—24 locations identified during the data review process were investigated. Follow-up location #15 exceeded the Reference Area static IL for region of interest (ROI) 8 (VD1). Follow-up locations are shown on the RSI Follow-up Static Survey map (page 7).

Note: Gamma readings reported in the Instrument and Survey Data table (page 1) for the gamma walkover and follow-up static surveys show the mean gamma gross count rate range(ROI,10,VD1) for all surveyed follow-up locations. Spectral analysis result of follow-up location 15 exceeded the Reference Area Static IL for region of interest (ROI) 8. Count rates in all radionuclide-specific ROIs (3, 6, 7 and 8) were less than the radionuclide-specific Reference Area static ILs for all other follow-up investigation locations.

Biased soil sample PE2-RSYB1-DC-B-S001 was collected and submitted for gamma spectroscopy analysis to further characterize the elevated soil reading at follow-up location 15 (see Summary Note 4 below).

3) Eighteen systematic soil samples (001-018) were obtained and submitted for gamma spectroscopy analysis. Sample locations for systematic samples are shown on the Systematic Sample Survey map (page 8). TestAmerica sample results are attached (pages 36-59).

Ten percent of the systematic soil samples (two samples in total, PE2-RSYB1-DC-S001 & PE2-RSYB1-DC-S011) were also analyzed for total strontium. Total Strontium results are also included in the TestAmerica sample results report (pages 36-59).

4) Biased sample survey—sample PE2-B1-DC-B-S001 was obtained and analyzed to support the evaluation of elevated gamma reading collected at follow-up location 15. Biased soil sample location are shown on the Biased Sample Survey map (page 9). TestAmerica sample results are attached (pages 60-71).

Note: Static gamma measurements collected at systematic and biased sample locations were obtained with a handheld Ludlum 2221 Scaler/Ratemeter and 3"x3" NaI probe; the results show gamma readings exceeding the instrument-specific Reference Area Static IL at several sample locations. Sample results indicate that this activity is due to the presence of naturally-occurring non-Navy program radionuclides in the excavated soil.

Conclusions:

All locations with elevated Z-scores identified by the RSI gamma walkover survey were determined to be consistent with background. 24 locations were investigated during the follow-up static survey, with one reading greater than the Reference Area static IL at follow-up location 15 for ROI 8 (VD1). Spectral analysis results and gamma static data for each region of interest (ROI) are provided (pages 10-33).

Final analytical results for systematic and biased samples from this RSY pad are concluded to be comparable to background. Histograms showing systematic soil sample activity concentrations are provided (pages 34-35). Ten percent of the systematic soil samples (two samples in total, PE2-RSYB1-DC-S001 & PE2-RSYB1-DC-S011) were also analyzed for total strontium, with concentrations less than the Project Action Limit of 0.331 pCi/g, as shown in the Soil Sample Data table (page 1).

This data package characterizes the construction base layer for RSY B1 pad. The soil was initially import clean material.

APTIM request RASO concurrence to release this soil as Non-LLRW.

Disposition: This soil shall be dispositioned as non-LLRW waste. The soil will be stockpiled onsite for reuse following appropriate chemical characterization.

RSI Data Evaluation Process

RS-700 Mobile Radiation Monitoring System

- Self-contained gamma-ray radiation detection and monitoring system
- (2) RSX-1 4-liter NaI(Tl) gamma detectors oriented perpendicular to the direction of travel (VD1 denotes both detectors summed; VD3 refers to the left detector; and VD4 refers to the right detector)
- Multi-Channel Analyzer, allowing for monitoring of energy-specific regions of interest (ROIs)
- RadAssist survey software for control, monitoring, and recording

Ten ROIs have been established for radium and progeny, cesium, and cobalt, as well as other naturally-occurring or anthropogenic gamma-emitting radionuclides that may be of interest:

ROI	Description	Energy Range (keV)	Primary Peak (keV)
1	Total counts	411 – 2811	N/A
2	Potassium	1371 – 1569	1460
3	U/Ra-226	1659 – 1860	1764 (Bi-214)
4	Thorium	2409 – 2811	2614 (Tl-208)
5	Annihilation	456 – 570	511
6	Ra-226	546 – 666	609 (Bi-214)
7	Cs-137	600 - 720	662
8	Pb-214/Ra-226	327 – 399	351
9	Co-60	1085 - 1370	1173/1332
10	Gross Counts	24 – 2811	N/A

A tiered approach is used during data review to identify follow-up locations. Raw data are exported to a comma delimited format using RadAssist and imported into an Excel spreadsheet for review and analysis. The following review steps are completed to determine if additional follow-up measurements are necessary:

- **Playback Review:** The data file is replayed in RadAssist and reviewed for elevated count rates in ROIs 6, 7, 9, and 10 for virtual detector (VD) 1 (both detectors summed). The scan screen is also monitored for elevated count rates and alarms.
- **Count Rate Time Series Review:** The count rates for ROIs 6, 7, 9, and 10 for VDs 1, 3 (detector 1), and 4 (detector 2) are plotted in a time series and reviewed for additional peaks in count rate.
- **All ROIs:**
 - **Z-Scores:** The Z-Scores are calculated for each location in all ROIs for VDs 1, 3, and 4. Any location with four or more ROIs having a Z-Score greater than three ($Z > 3$) is marked for follow-up.
 - **Local Z-Scores:** Local Z-Scores are calculated using a moving average for each data point in all ROIs for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) with four or more ROIs having a local $Z > 3$ is marked for follow-up.
 - **Semi-local Z-Scores:** Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) with four or more ROIs having a semi-local $Z > 3$ is marked for follow-up.
- **ROIs 3, 6, 8, and 10 (radium-specific ROIs):**
 - **Z-Scores:** The Z-Scores are calculated for each location in the radium-specific ROIs for VDs 1, 3, and 4. Any location with three or more radium-specific ROIs having a $Z > 3$ is marked for follow-up.
 - **Local Z-Scores:** Local Z-Scores are calculated using a moving average for each data point in the radium-specific ROIs for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) with three or more radium-specific ROIs having a local $Z > 3$ is marked for follow-up.
 - **Semi-local Z-Scores:** Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise

be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) with three or more radium-specific ROIs having a semi-local $Z > 3$ is marked for follow-up.

- **ROI 7 (cesium-specific ROI):**
 - Z-Scores: Z-Scores are calculated for each location in ROI 7 for VDs 1, 3, and 4. Any location having a $Z > 3$ is marked for follow-up.
 - Local Z-Scores: Local Z-Scores are calculated using a moving average for each data point in ROI 7 for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) having a local $Z > 3$ is marked for follow-up.
 - Semi-local Z-Scores: Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation in ROI 7 for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) having a semi-local $Z > 3$ is marked for follow-up.
- **ROI 9 (cobalt-specific ROI):**
 - Z-Scores: Z-Scores are calculated for each location in ROI 9 for VDs 1, 3, and 4. Any location having a $Z > 3$ is marked for follow-up.
 - Local Z-Scores: Local Z-Scores are calculated using a moving average for each data point in ROI 9 for VDs 1, 3, and 4 to identify elevated count rates where the background is variable (e.g. multiple surface types). Any location (in a survey unit that meets this condition) having a local $Z > 3$ is marked for follow-up.
 - Semi-local Z-Scores: Semi-local Z-Scores are calculated using the global average, but with a moving average for the standard deviation in ROI 9 for VDs 1, 3, and 4. This is used for survey data that have a consistent background but an area or areas of highly elevated count rates, in order to identify smaller areas of elevated count rates that may not otherwise be identified by the initial Z-score review. Any location (in a survey unit that meets this condition) having a semi-local $Z > 3$ is marked for follow-up.
- **Z-Score Time Series Review:** The three types of Z-Scores for ROIs 6, 7, 9, and 10 for VDs 1, 3, and 4 are plotted in a time series and reviewed for additional peaks in Z-Scores.

Any location selected for follow-up or with a Z-Score > 3 in a radium-, cesium-, or cobalt-specific ROI will undergo spectral analysis to determine if it is statistically likely that there are ROC concentrations present at that location in quantities greater than background.

A background spectrum is subtracted from the local spectral data for a given location, and the resulting net spectrum is plotted. Critical levels, as defined in Section 6.7.1 of the Multi Agency Radiation Survey and Site Investigation Manual are calculated and plotted based on background levels. The critical level is the level, in counts, at which there is a statistical probability (with a predetermined confidence) of incorrectly identifying a measurement system background value as greater than background. Any response above this level is considered to be greater than background. The critical level is calculated for ROIs 6, 7, 8, and 9 according to the equation shown below:

Where:

$$L_C = 2.33\sqrt{B}$$

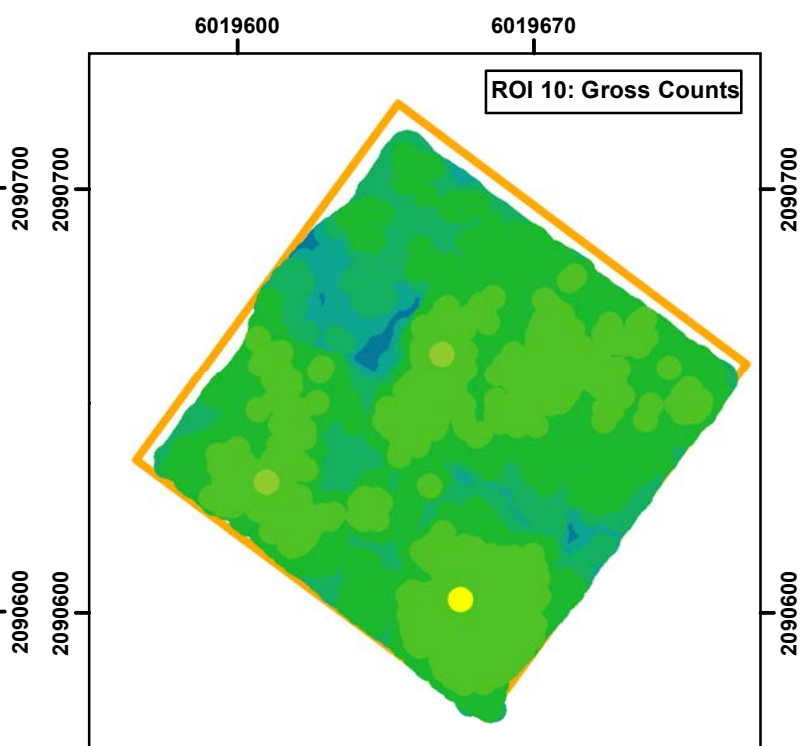
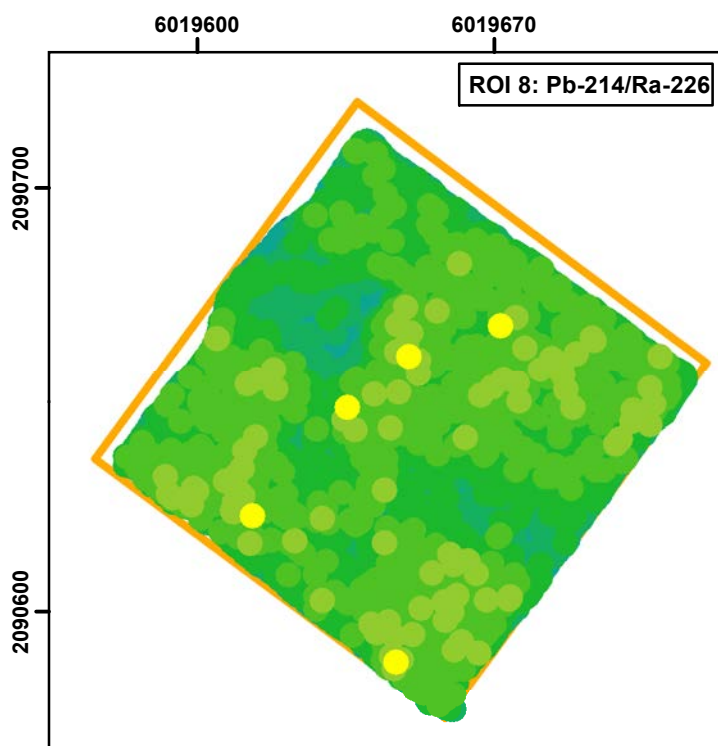
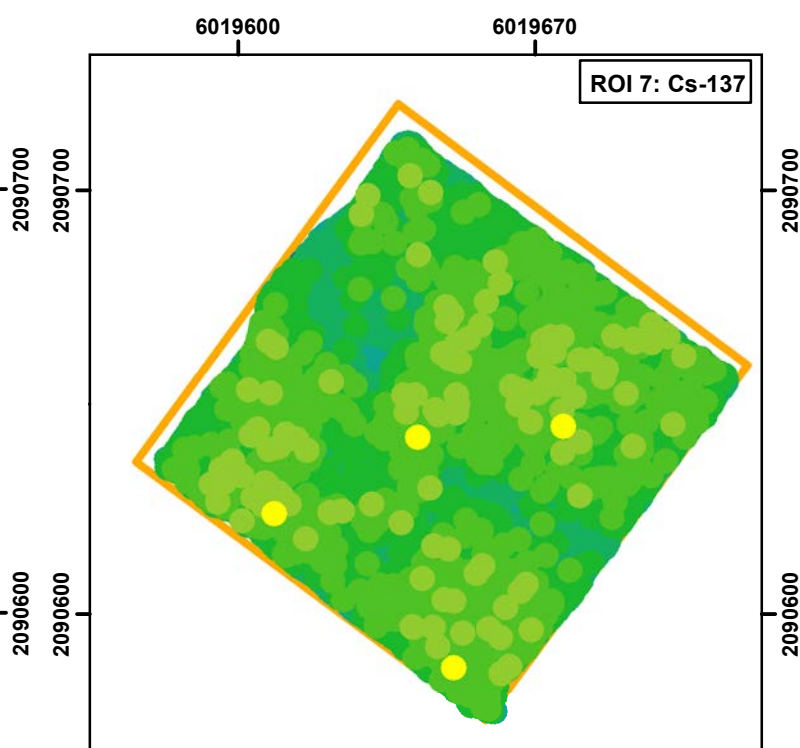
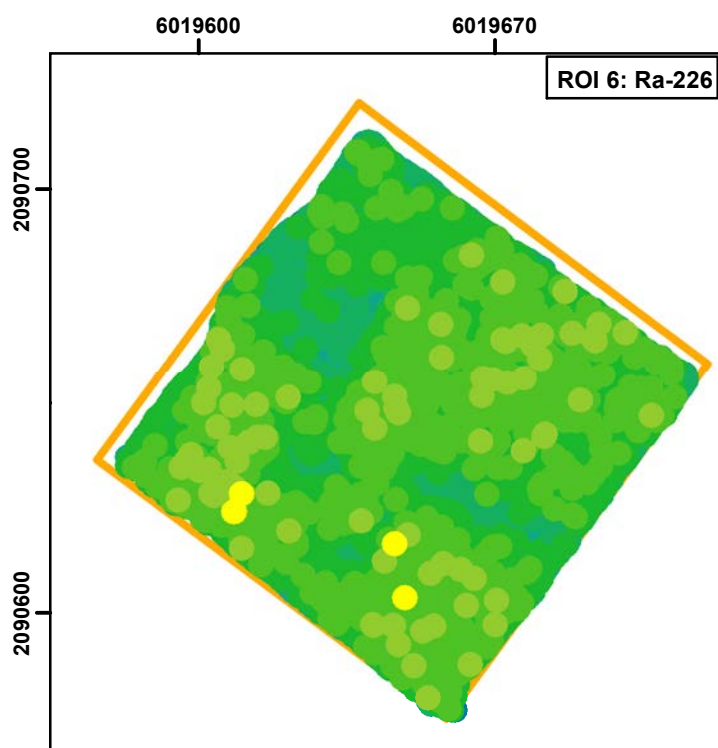
LC	=	critical level (counts)
B	=	average background in the ROI

When count rates in the net gamma spectrum at a given location do not exceed critical levels for any radium-, cesium-, or cobalt-specific energy ranges, it is unlikely that ROC concentrations exist at that location above background.

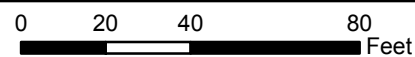
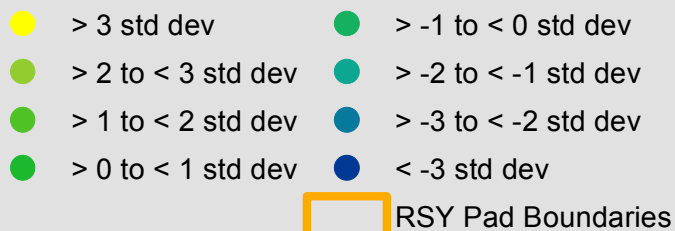
Any data point that is both above the critical level and within the energy range of a given ROI is considered above background for that radionuclide and will be flagged for further investigation in the field.

HPNS Parcel E-2 RSY Pad B1 Deconstruction

Contour Maps



RS 700 Gamma Walkover Survey Data (VD1)



Coordinate system: CSP Zone III. NAD83, US Survey Foot



RSI Review Summary

Summary:

24 locations were initially selected for follow-up investigation. Locations were identified by elevated peaks noted in the playback review and/or time series charts, and by using the Z-Score, Local Z-Score, and Semi-Local Z-Score reviews as described in the RSI Data Evaluation Process on pages 3-4. Spectral analyses performed on gamma static data at location #15 exceeded the Reference Area Static IL for region of interest (ROI) 8. All other gamma static readings at follow-up locations were less than the Reference Area static IL for ROIs 3, 6, 7, and 8; figures for all locations are provided on pages 10-33.

RSI Follow-up Static Survey
HPRS-07302018-PE2-JSS2-2848

HPNS Parcel E-2 RSY Pad B1 (DC)

6019600

6019670

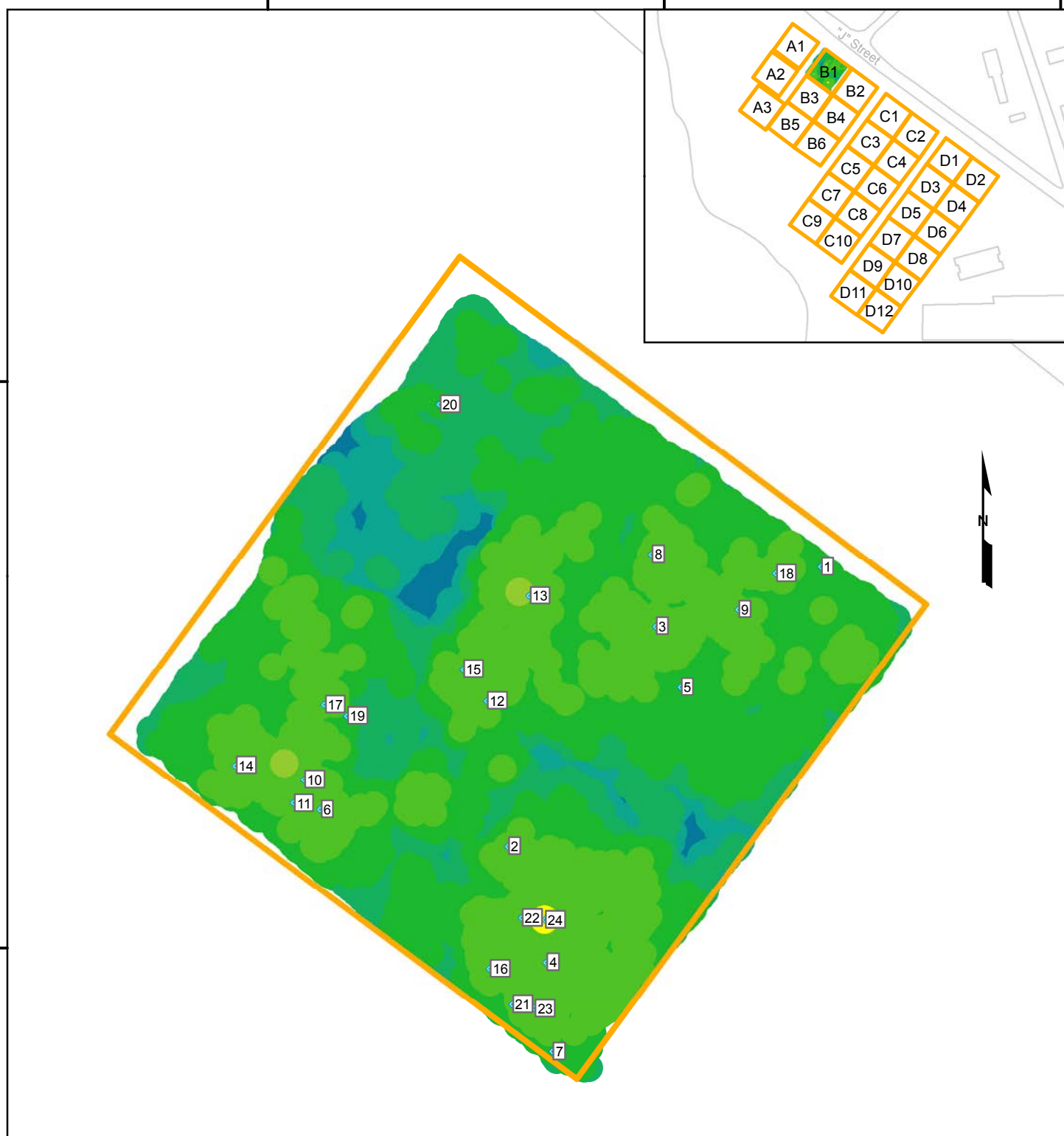
6019740

2090700

2090700

2090600

2090600



RS 700 Gamma Walkover Survey Data (VD1, ROI 10)

- ◆ Follow-up Locations
- > 3 std dev
- > 2 to < 3 std dev
- > 1 to < 2 std dev
- > 0 to < 1 std dev
- > -1 to < 0 std dev
- > -2 to < -1 std dev
- > -3 to < -2 std dev
- < -3 std dev
- ▭ RSY Pad Boundaries

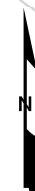
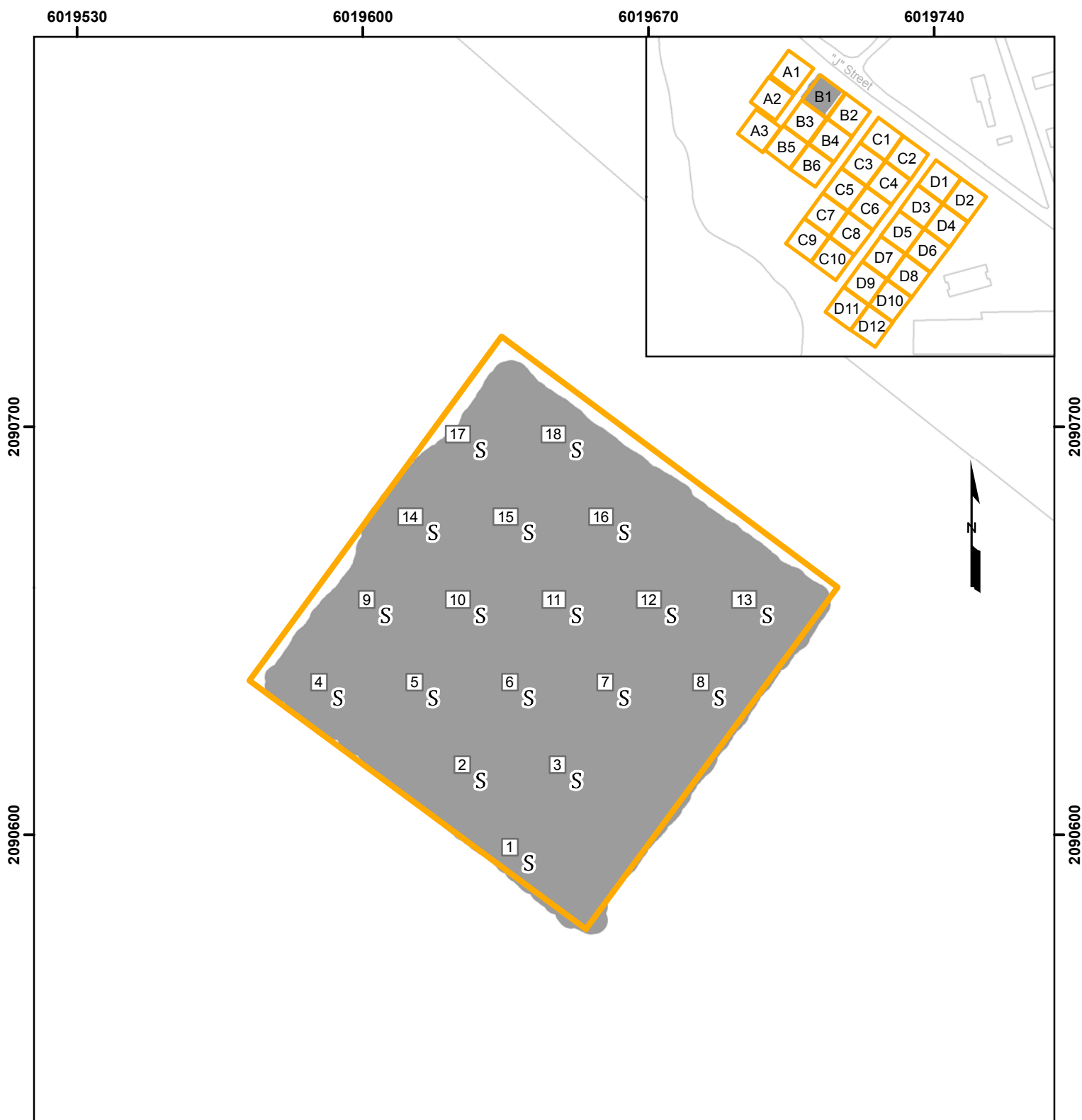
0 10 20 40
Feet

Coordinate system: CSP Zone III. NAD83, US Survey Foot



Systematic Sample Survey
HPRS-08022018-PE2-JSS-2900

HPNS Parcel E-2 RSY Pad B1-DC



Survey Instrument: Model 2221/ 44-20
Serial Number: 117634

- S Systematic Sample Locations
- RS-700 GWS Scan Coverage
- RSY Pad Boundaries

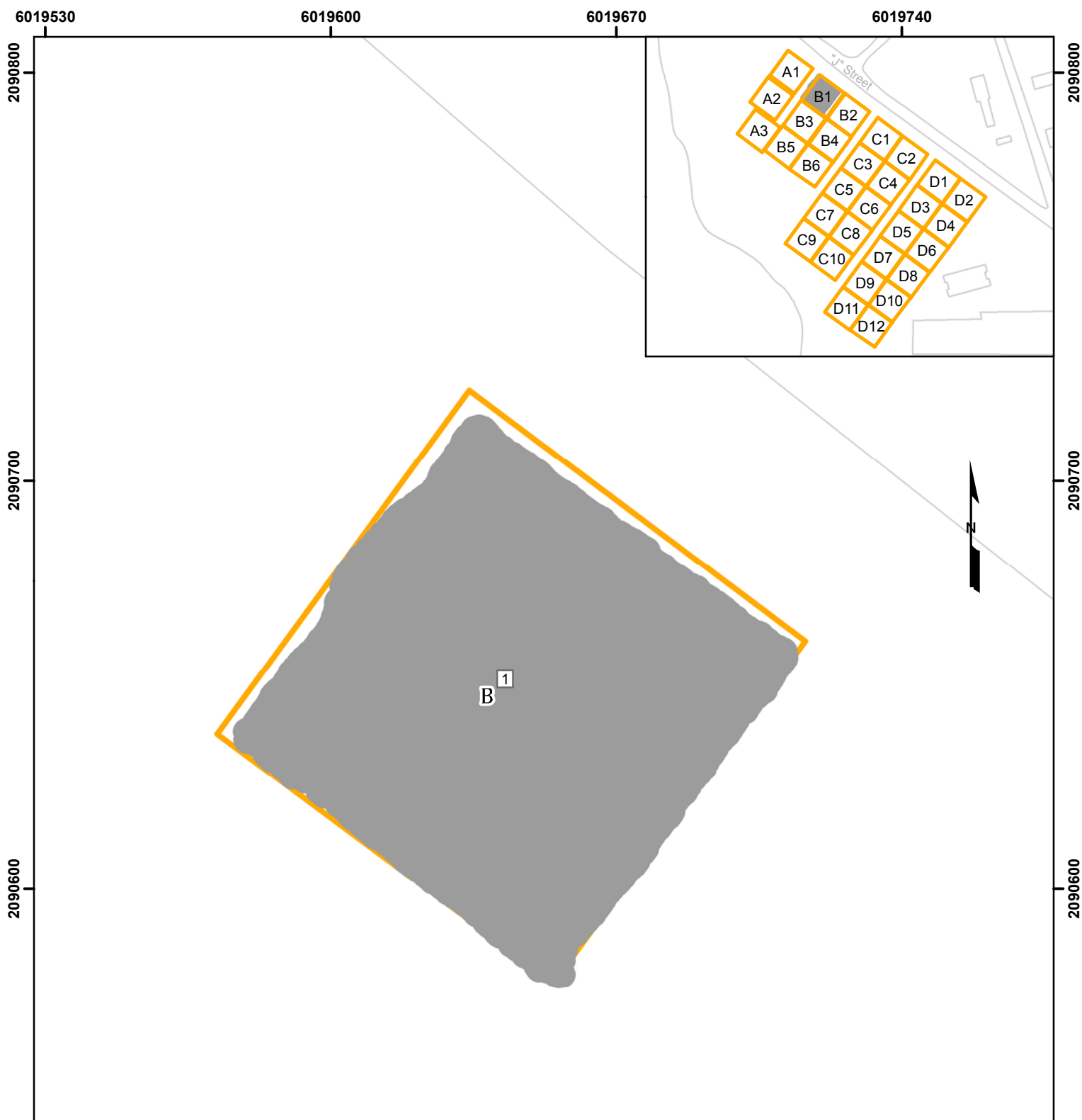
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Biased Sample Survey
HPRS-08022018-PE2-JSS-2877

HPNS Parcel E-2 RSY Pad B1-DC



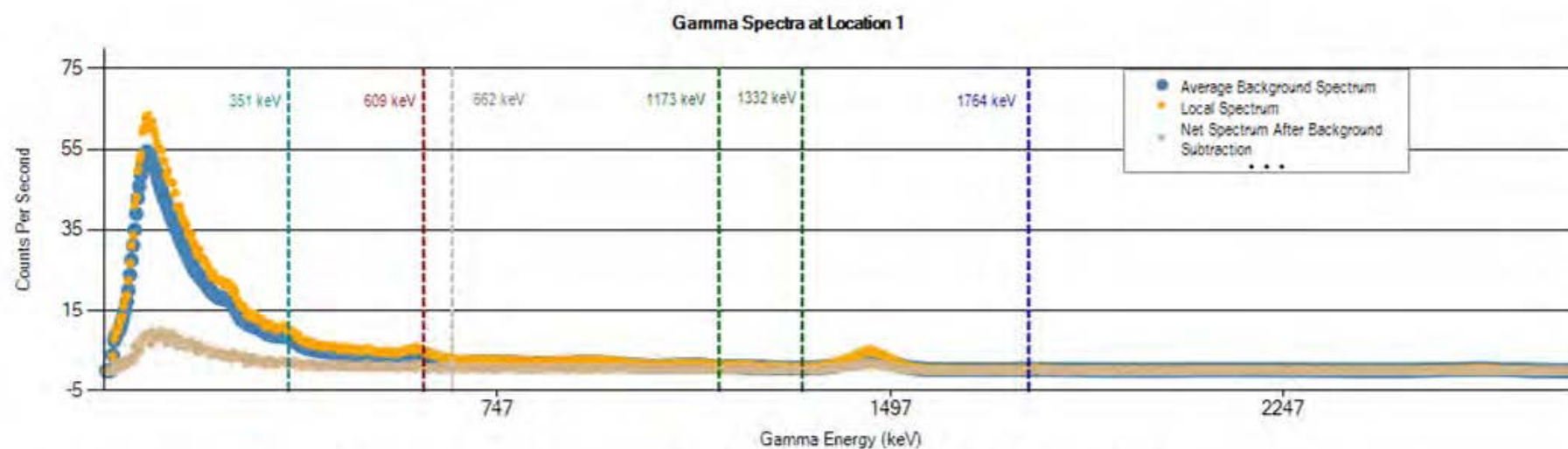
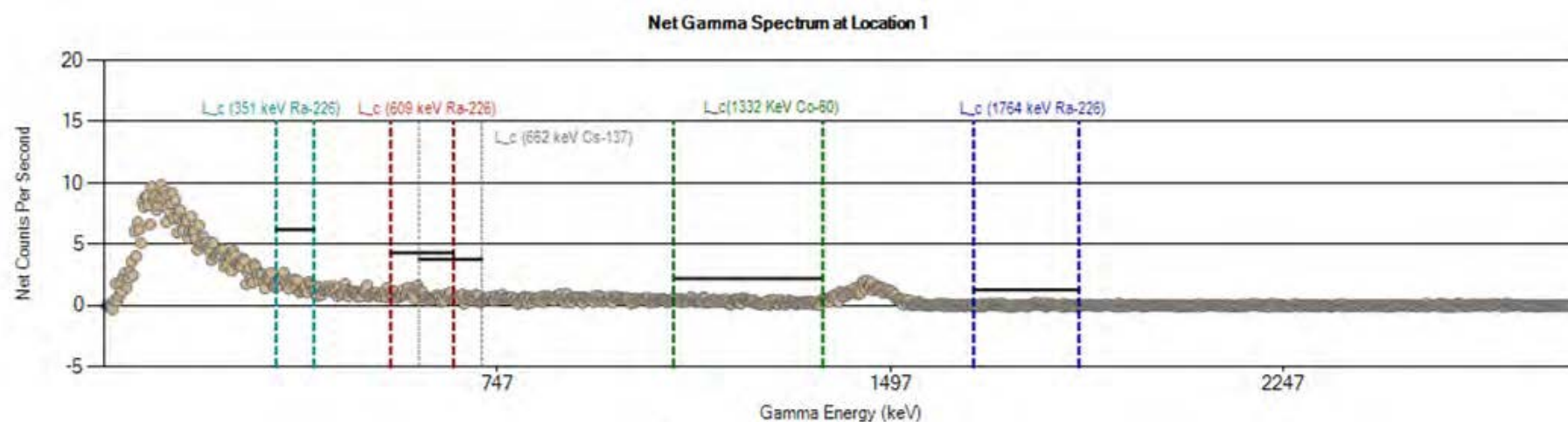
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Serial Number: 117634

- B Biased Sample Location
- RS-700 GWS Scan Coverage
- RSY Pad Boundaries

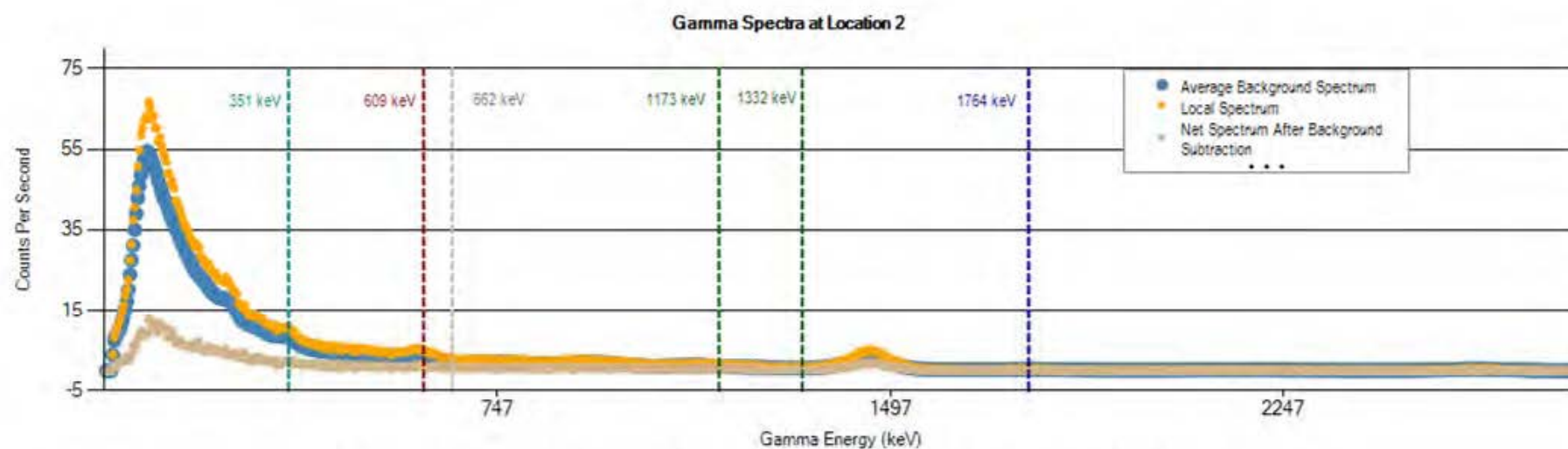
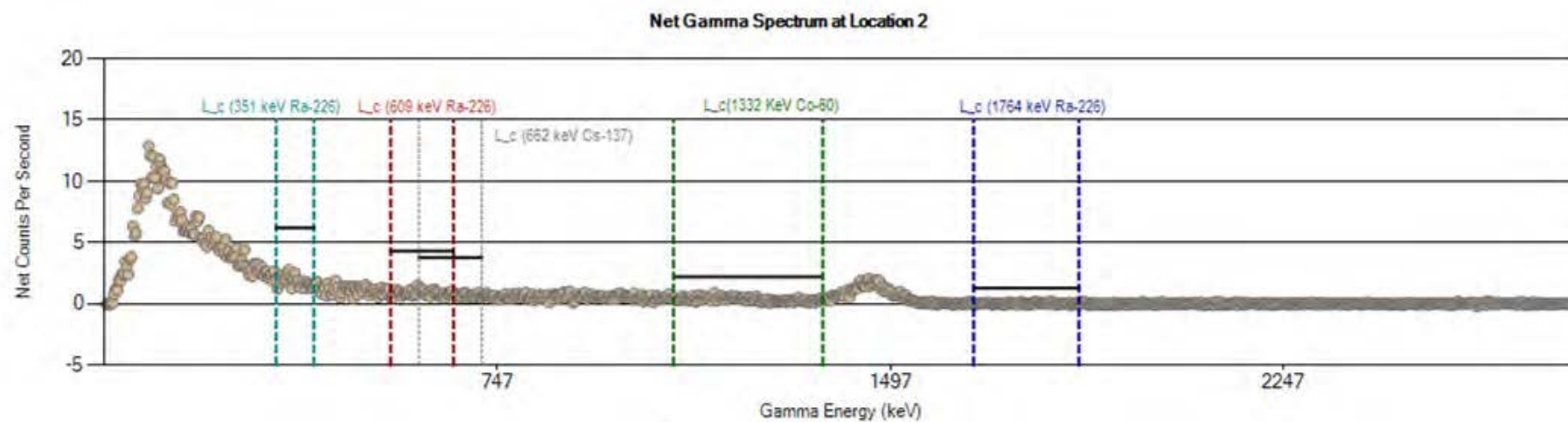
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Coordinate system: CSP Zone III. NAD83, US Survey Foot

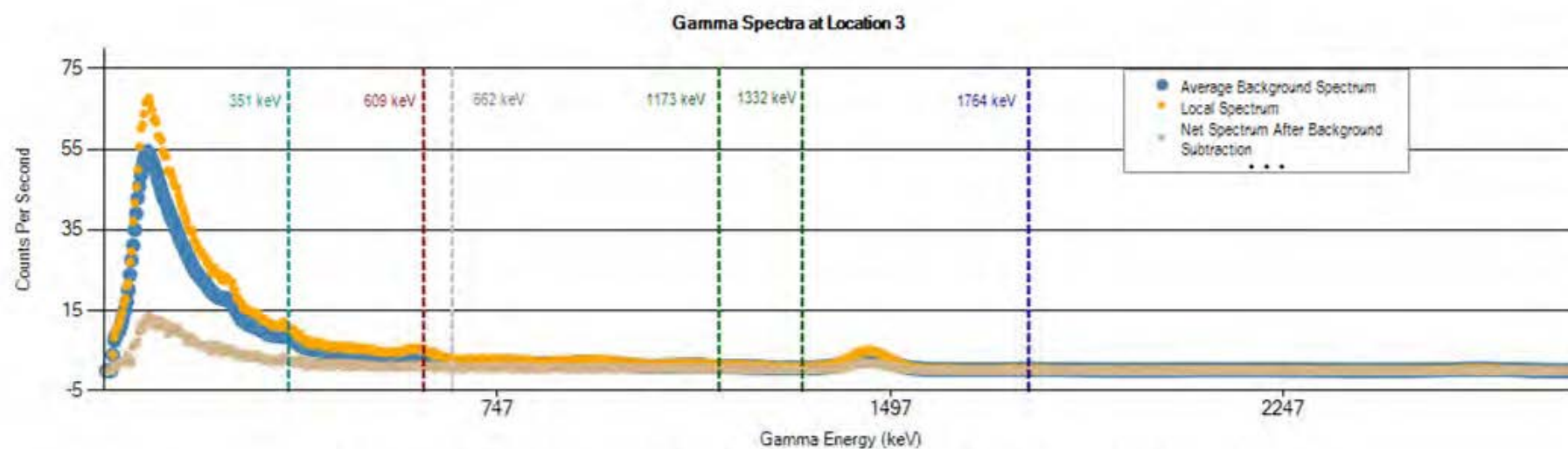
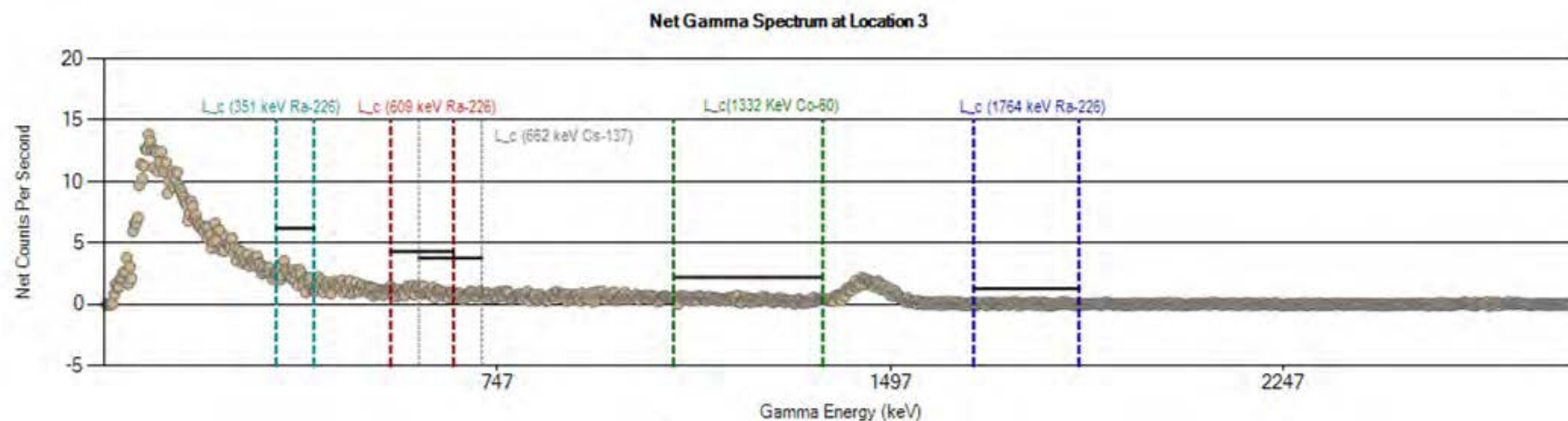




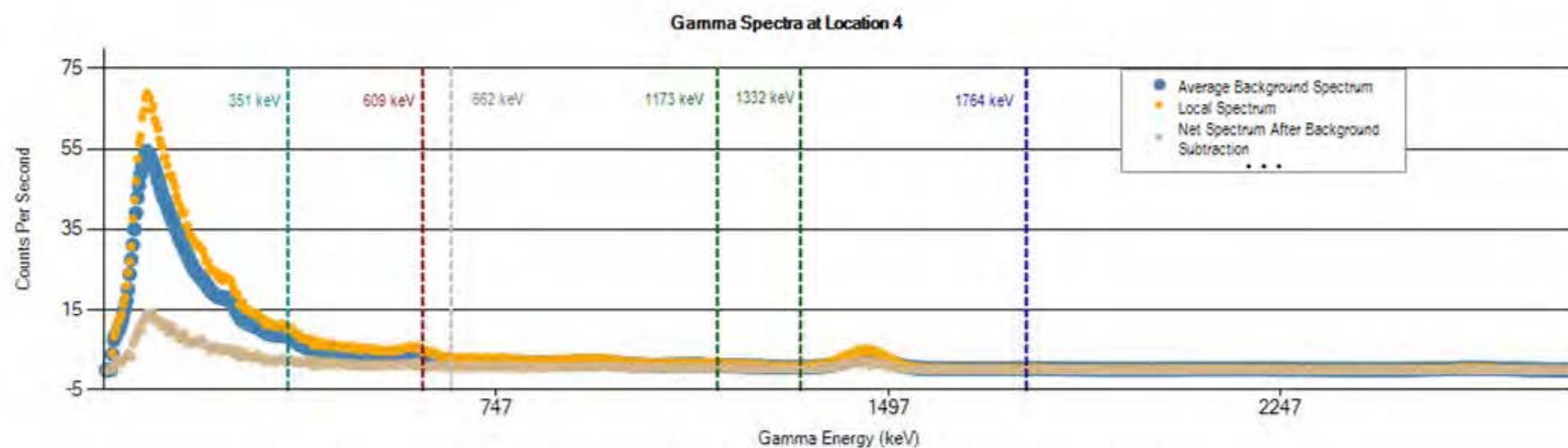
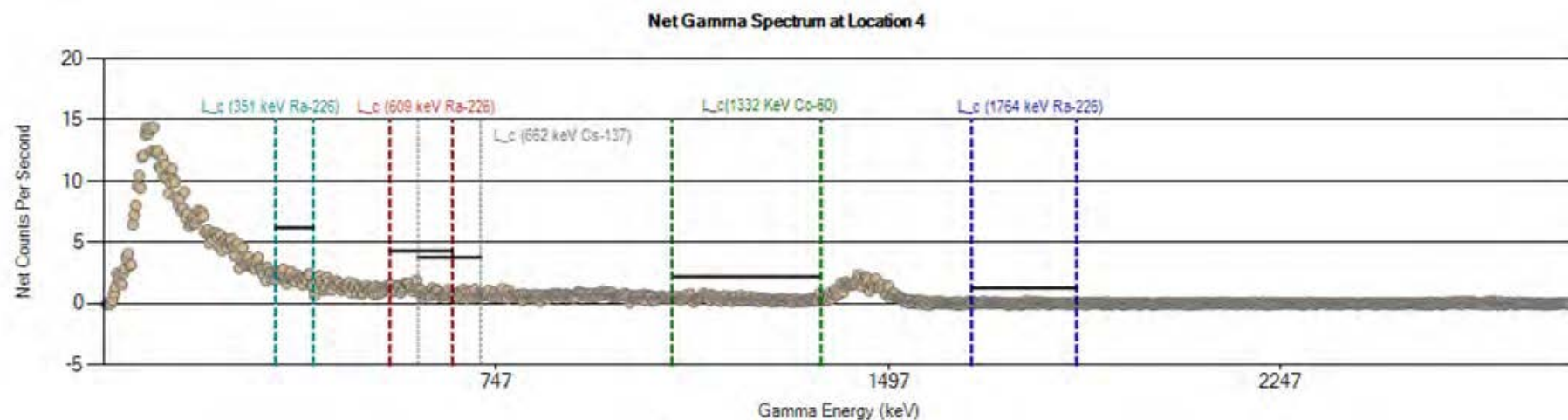
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 1 (cps)	1112	171	23	27	191	174	134	218	121	4414
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



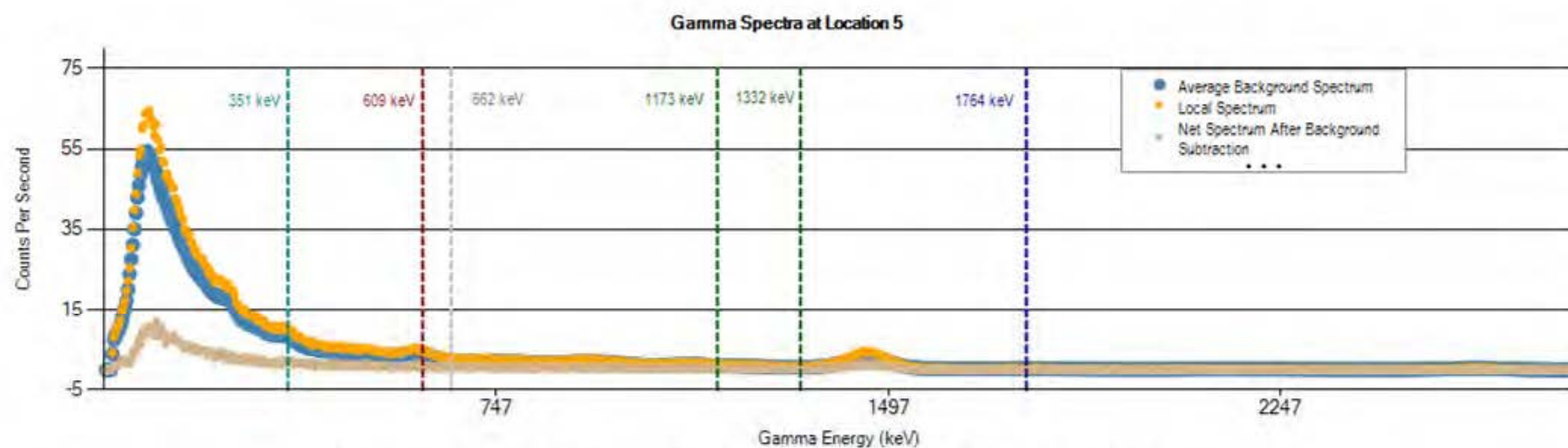
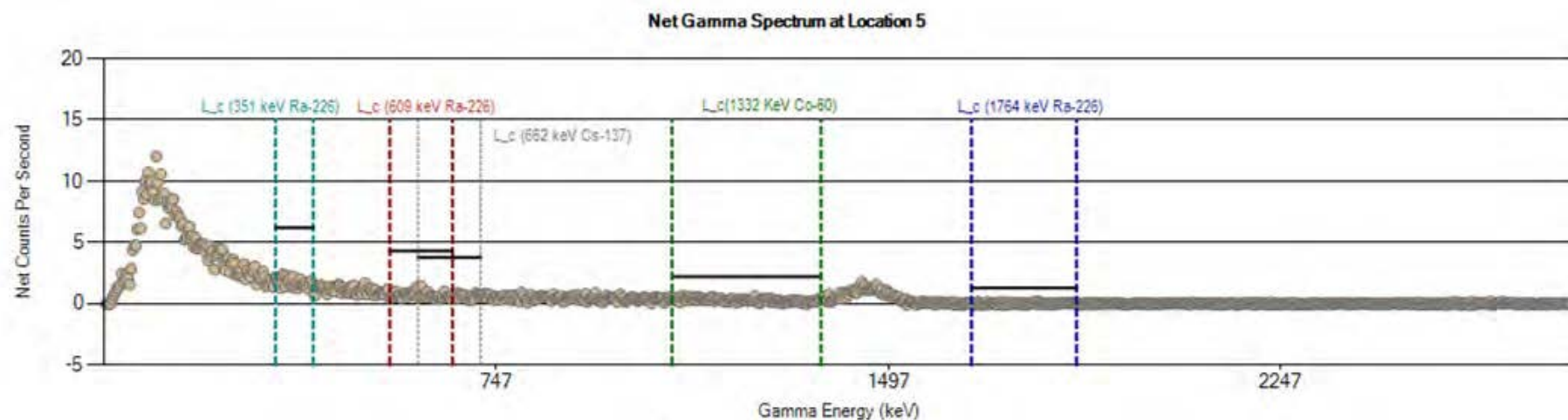
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 2 (cps)	1125	174	23	27	192	177	140	219	123	4503
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



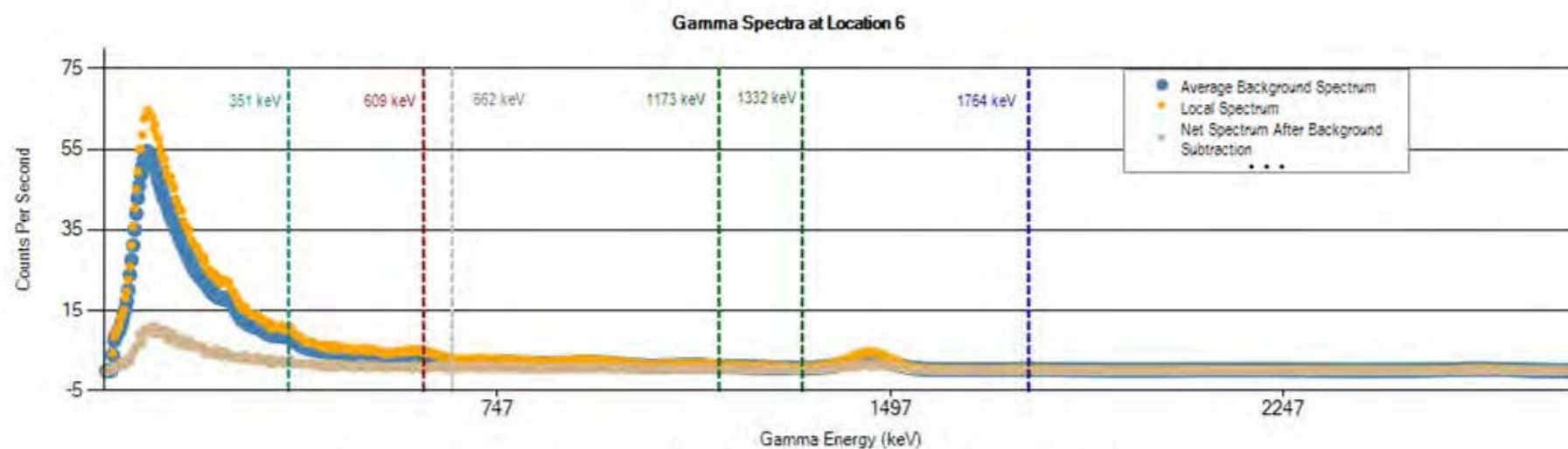
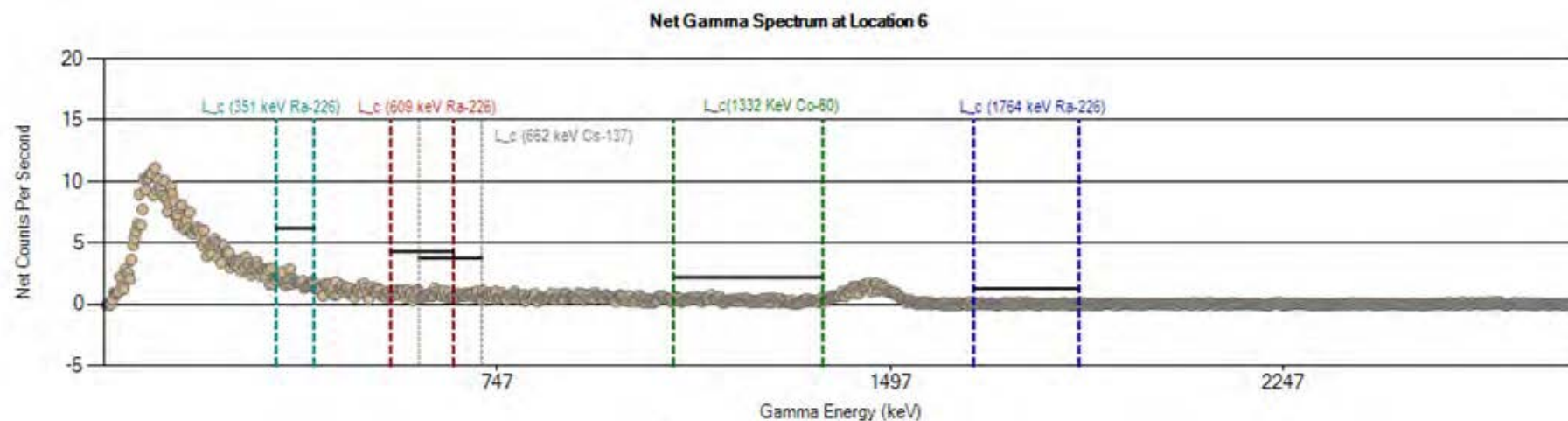
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Location 3 (cps)	1160	176	24	27	198	182	143	229	127	4629
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 4 (cps)	1162	179	23	28	199	184	140	226	125	4633
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255

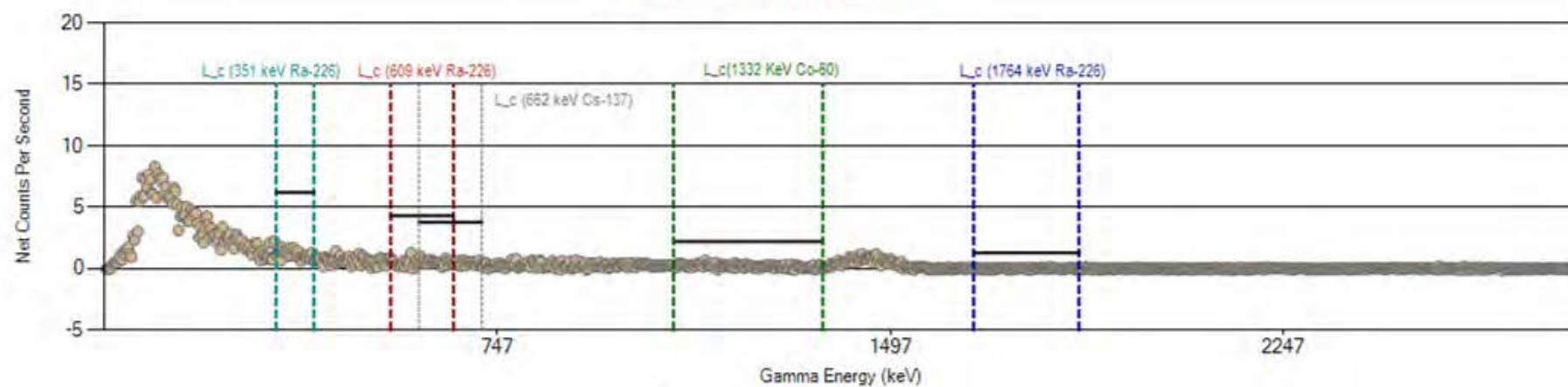


	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 5 (cps)	1075	160	22	25	187	168	133	216	117	4362
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255

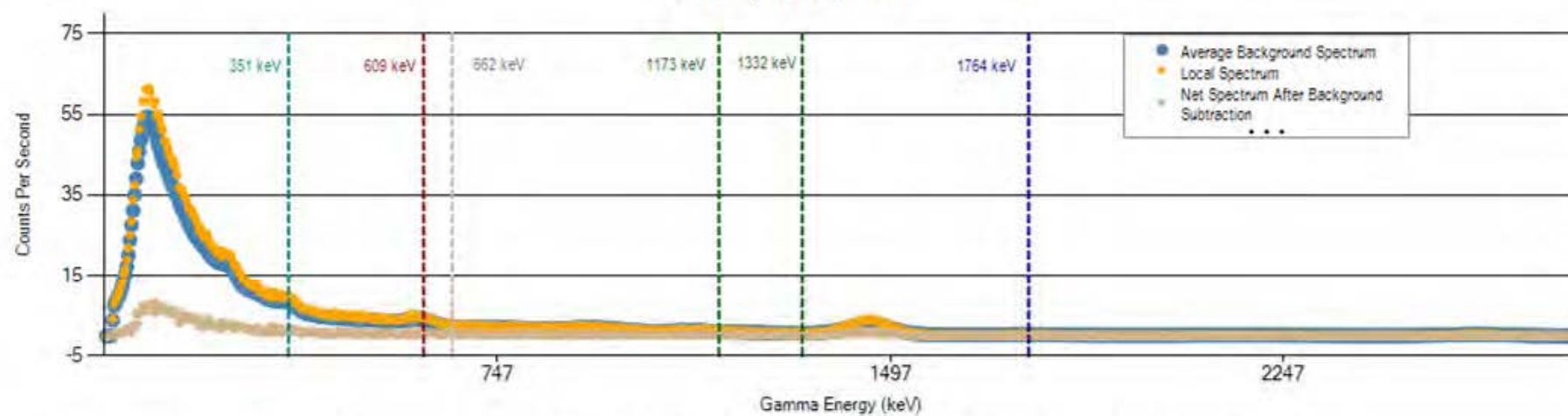


	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 6 (cps)	1119	170	23	28	191	174	138	221	120	4464
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255

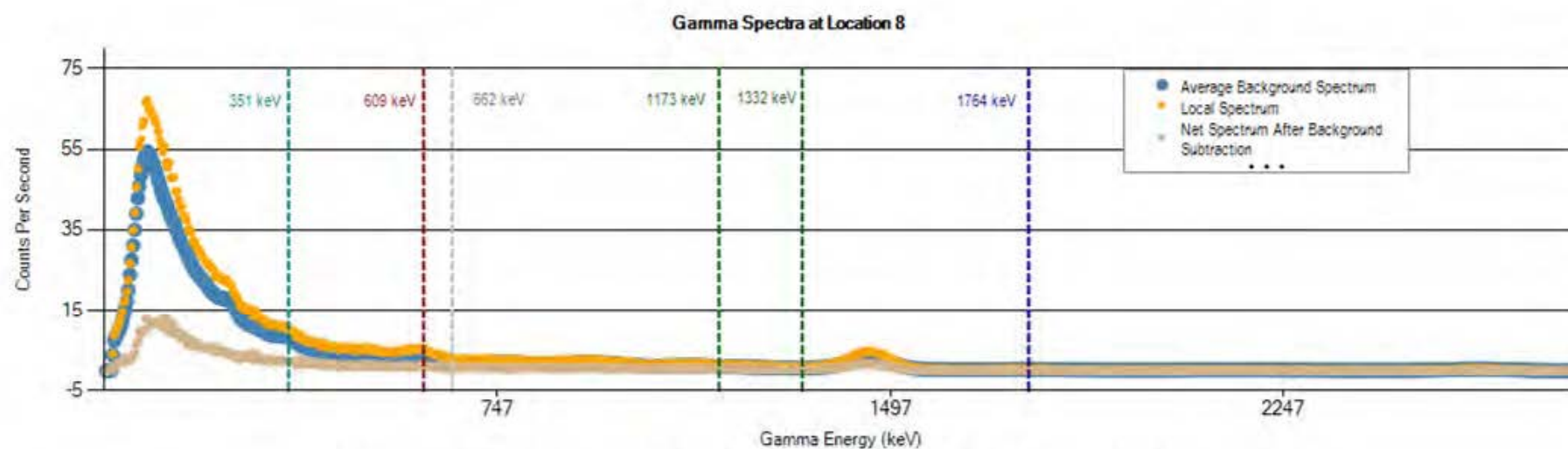
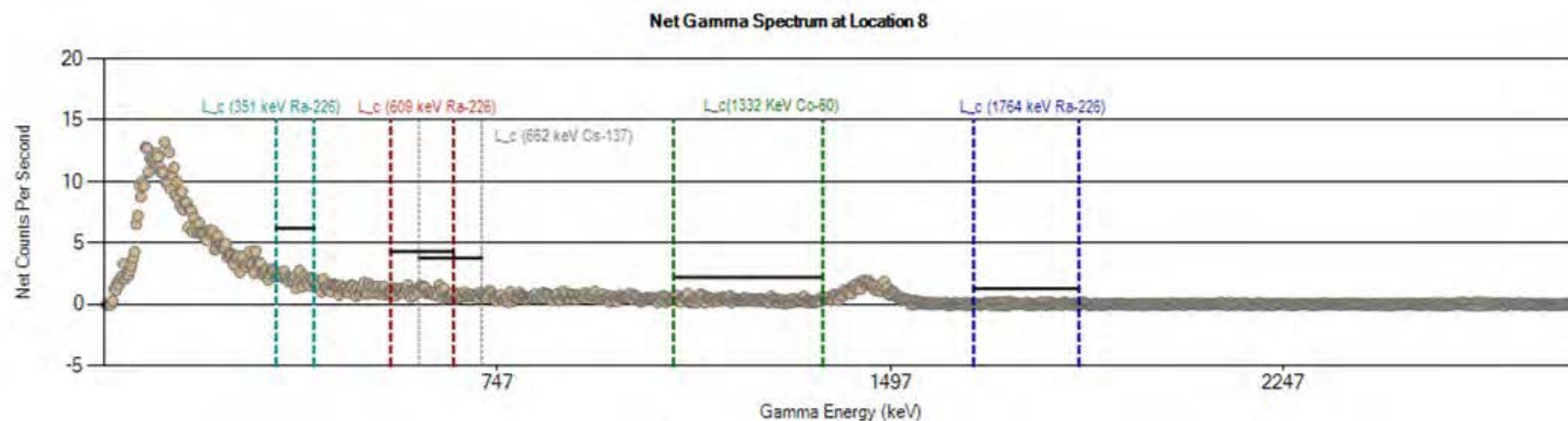
Net Gamma Spectrum at Location 7



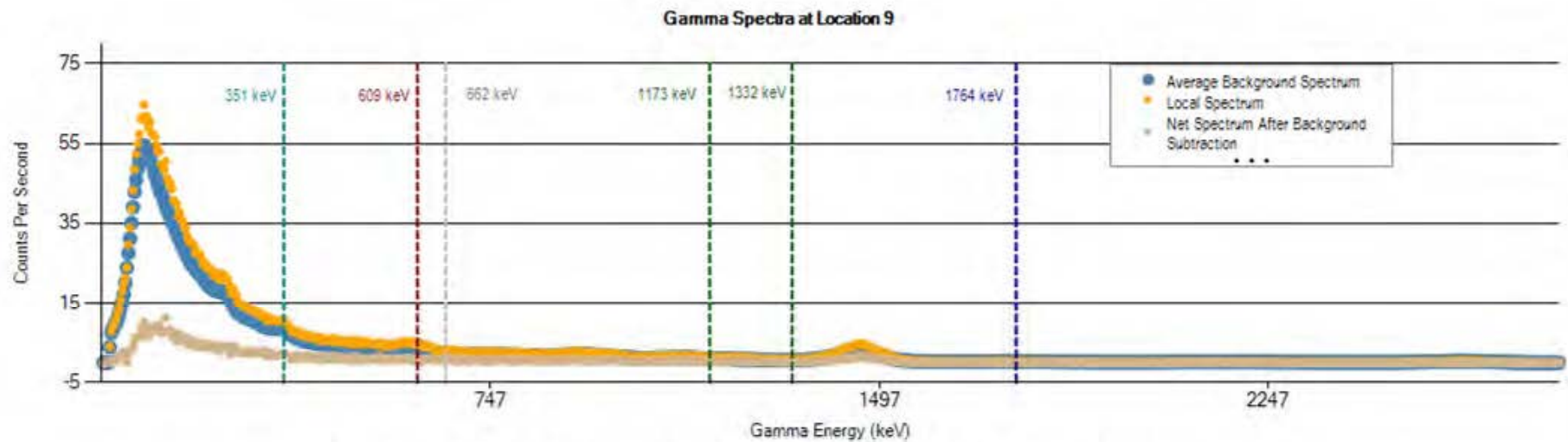
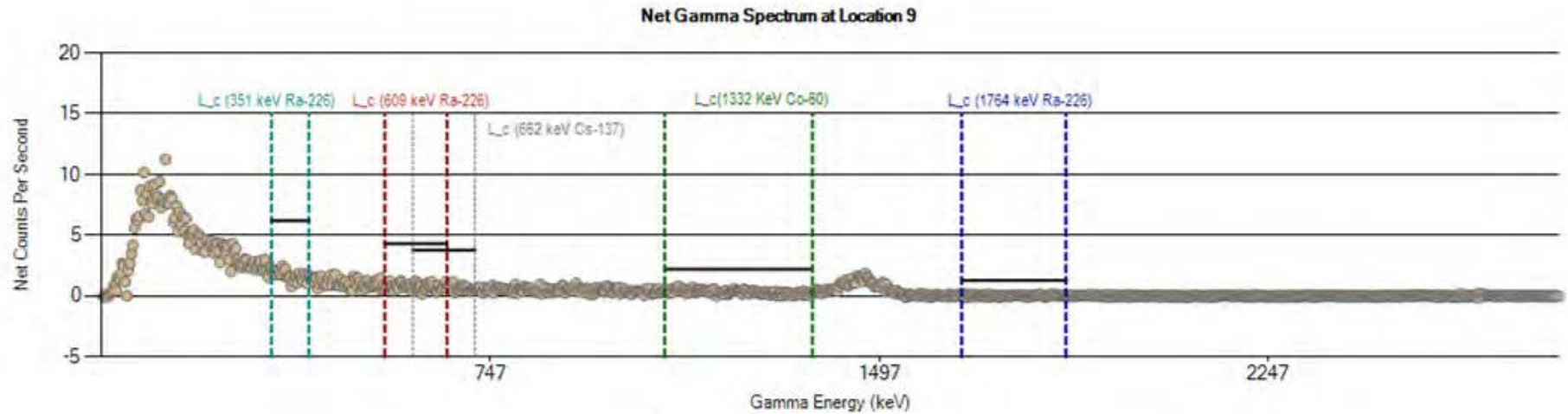
Gamma Spectra at Location 7



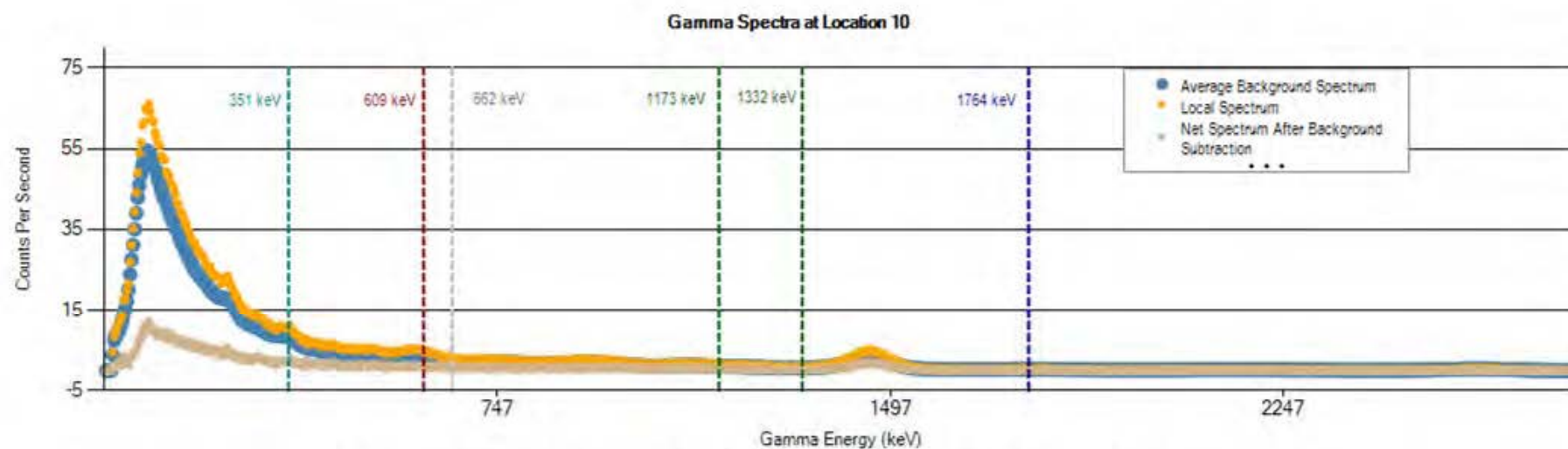
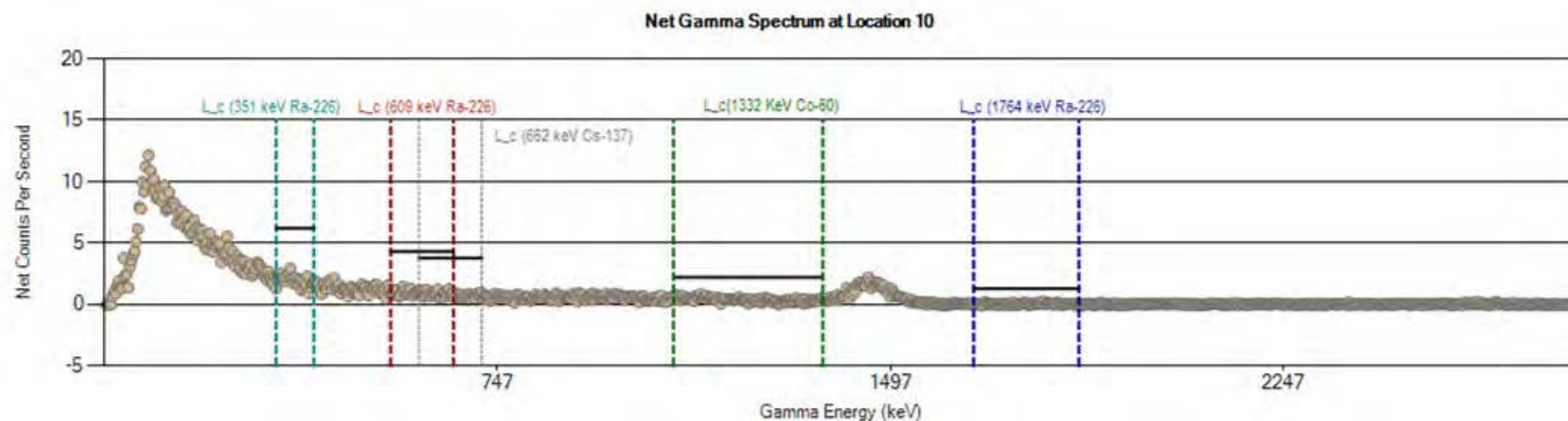
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 7 (cps)	1001	146	22	25	174	160	127	203	108	4138
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



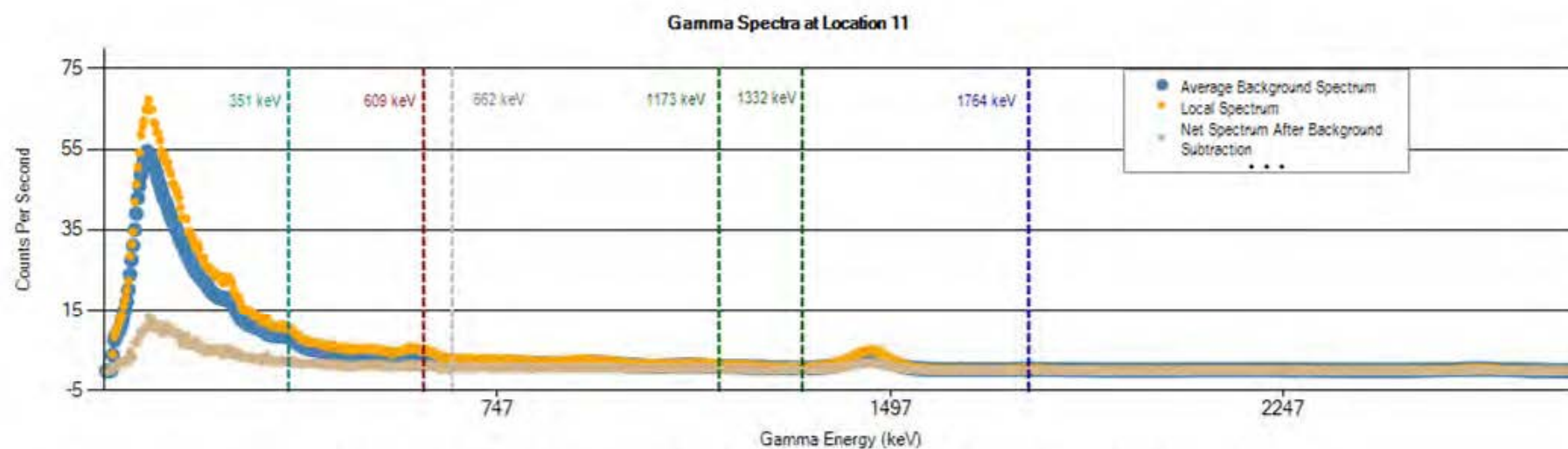
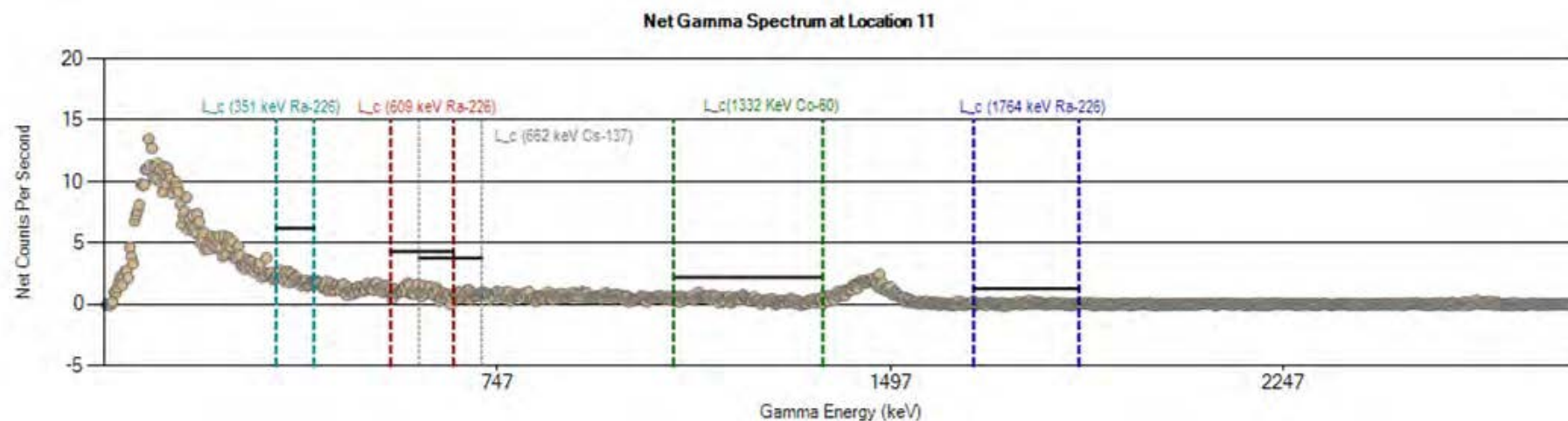
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 8 (cps)	1141	173	24	27	197	182	142	227	125	4572
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



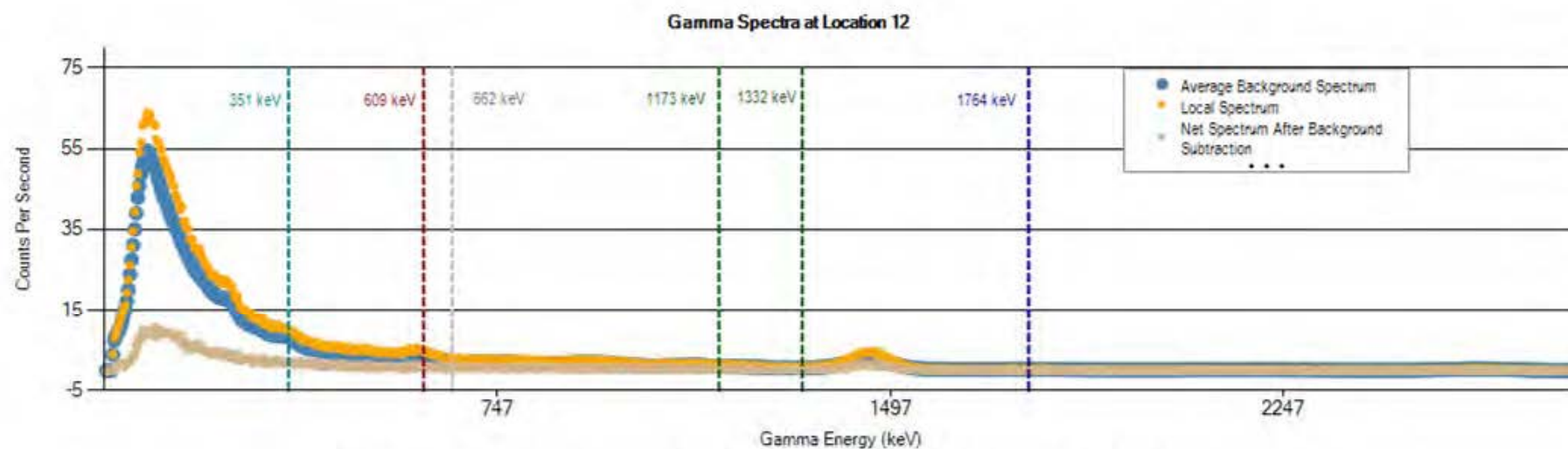
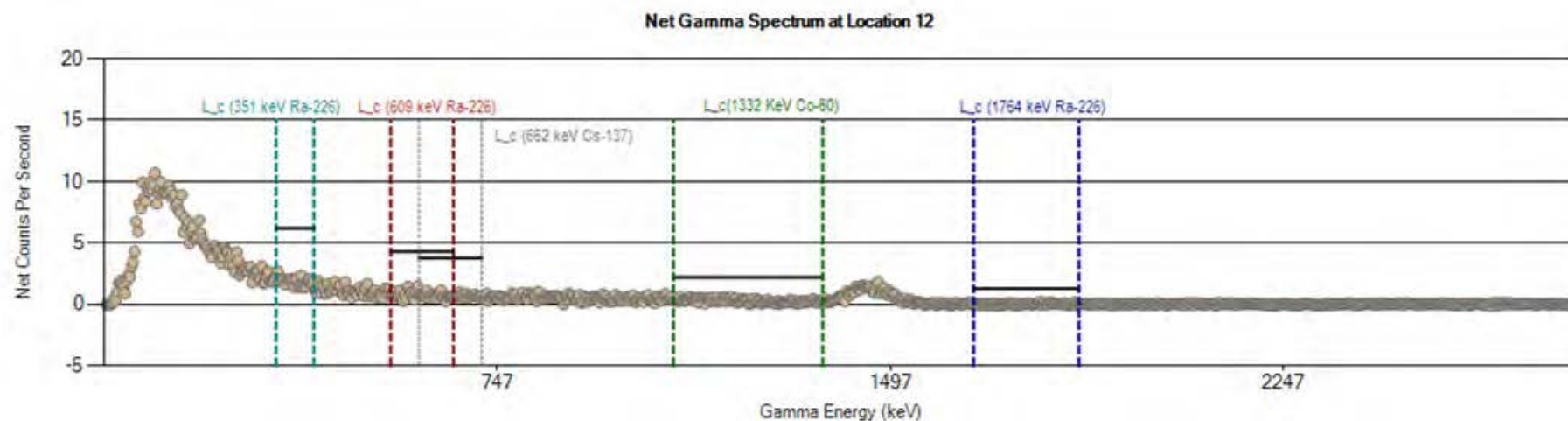
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 9 (cps)	1091	162	23	26	188	173	136	216	120	4365
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



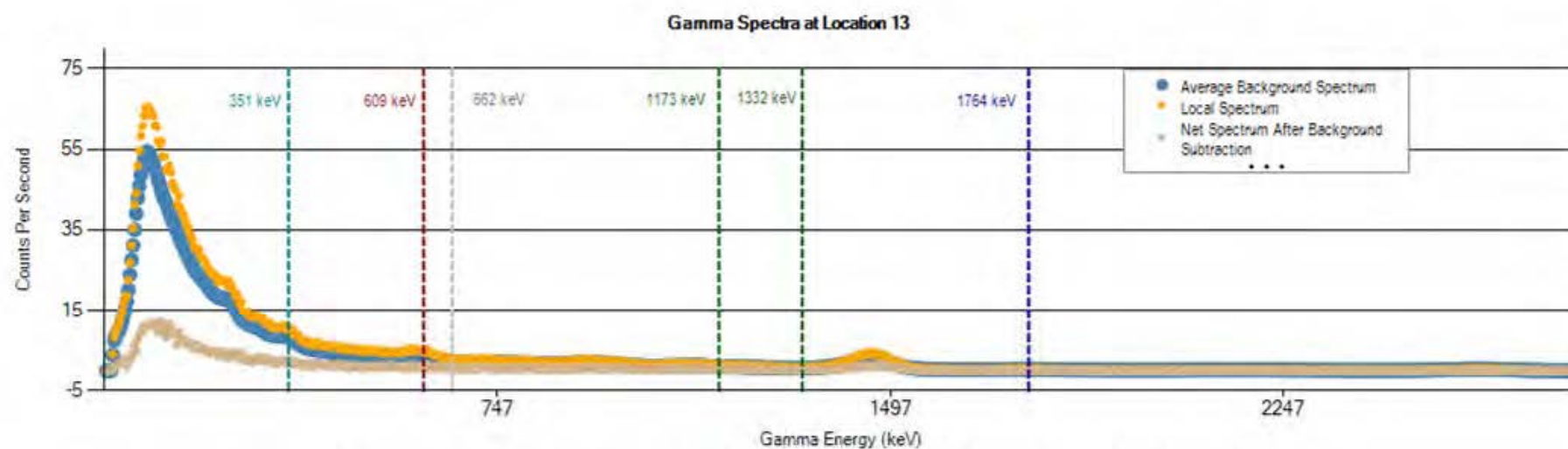
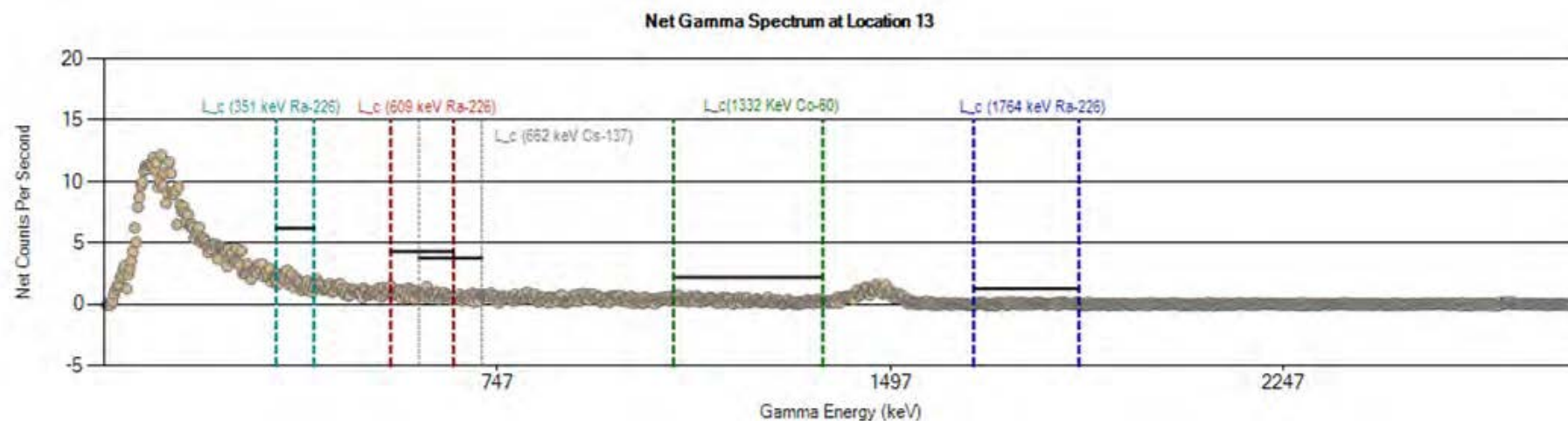
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Location 10 (cps)	1136	172	23	27	196	179	140	223	125	4482
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



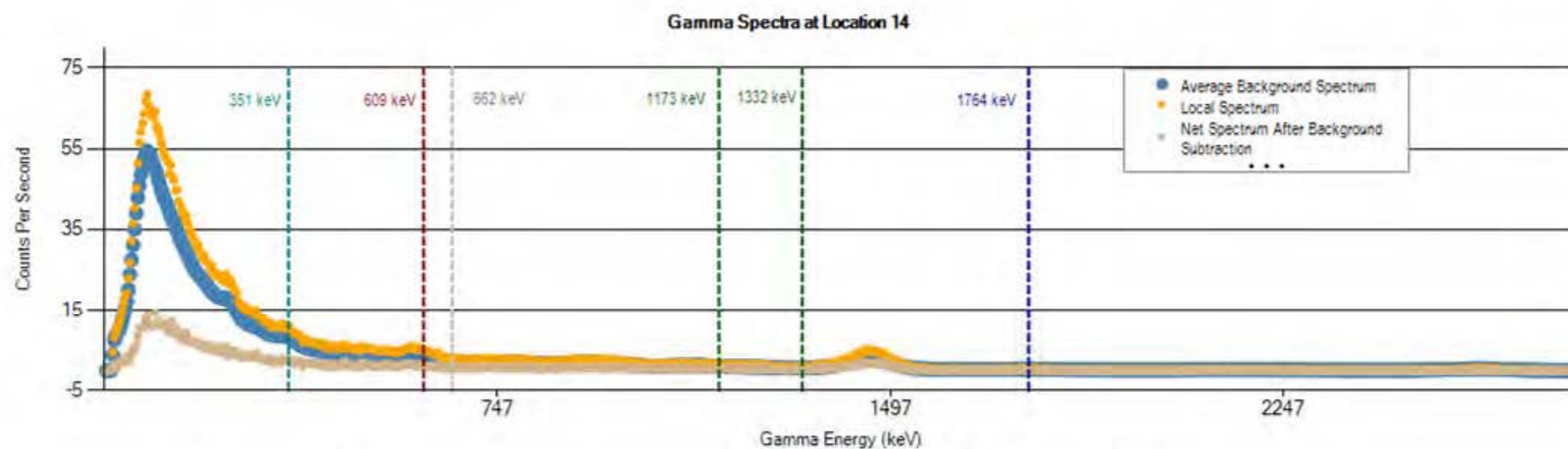
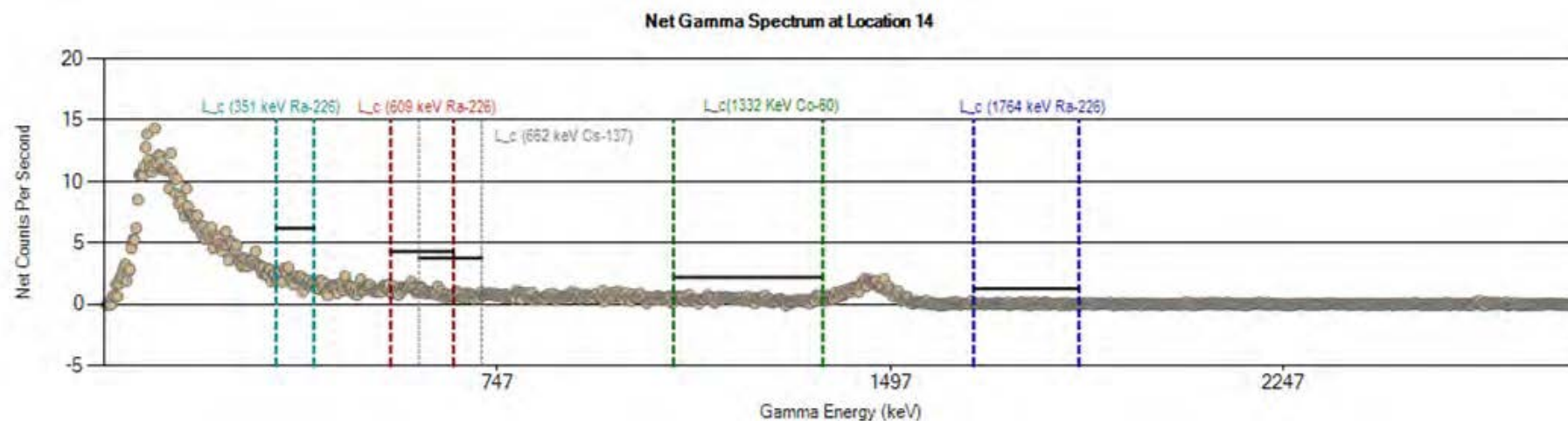
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 11 (cps)	1162	180	24	29	199	181	142	226	126	4578
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



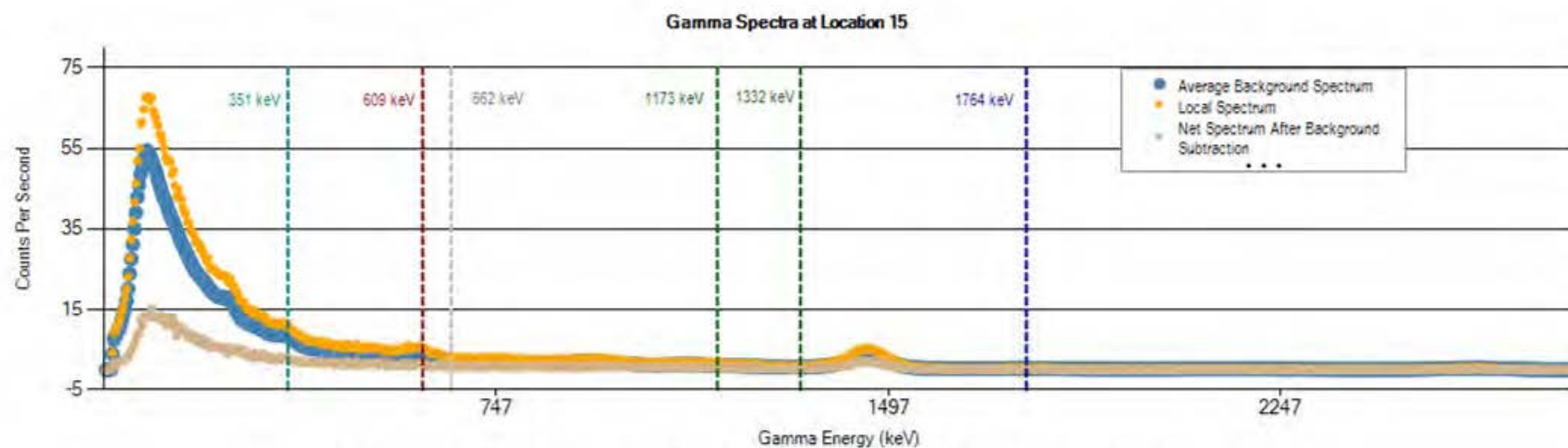
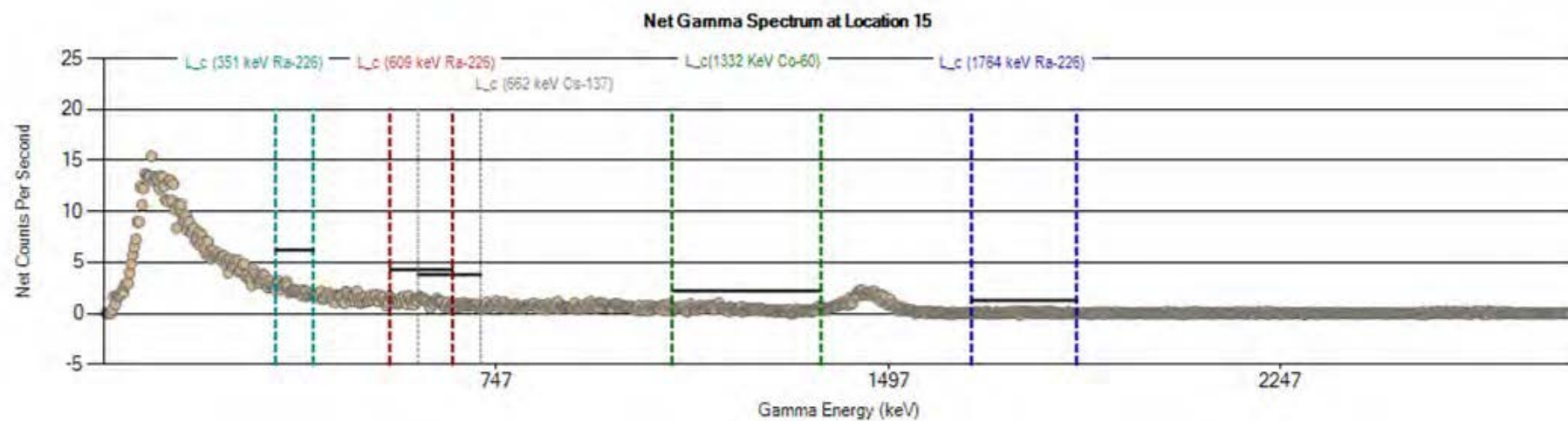
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 12 (cps)	1094	162	23	27	187	171	136	221	118	4422
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



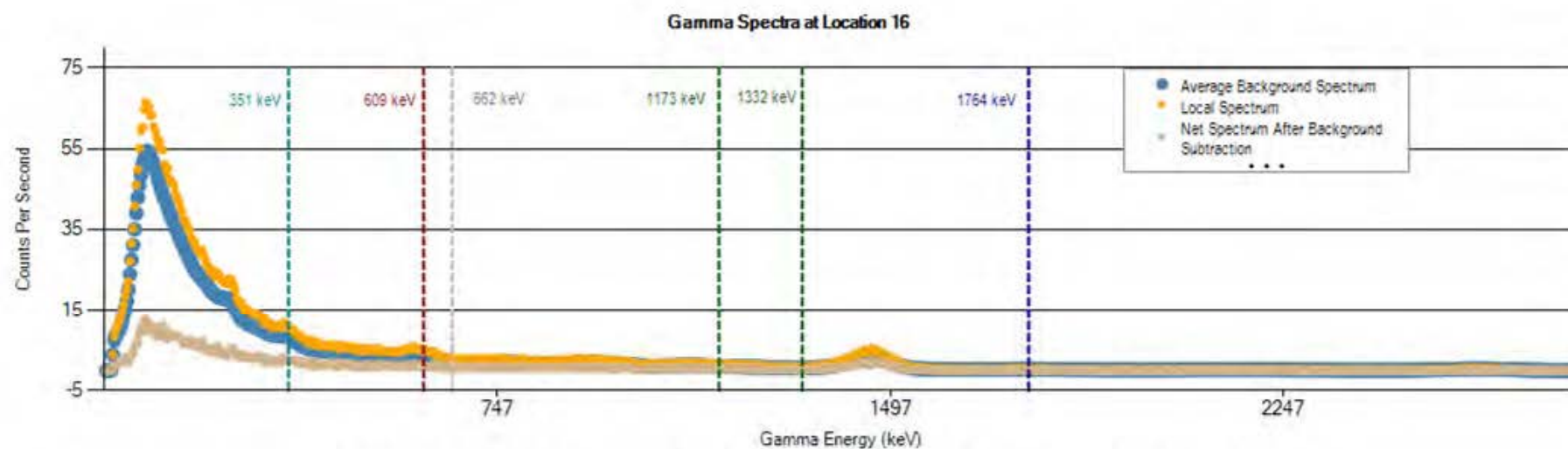
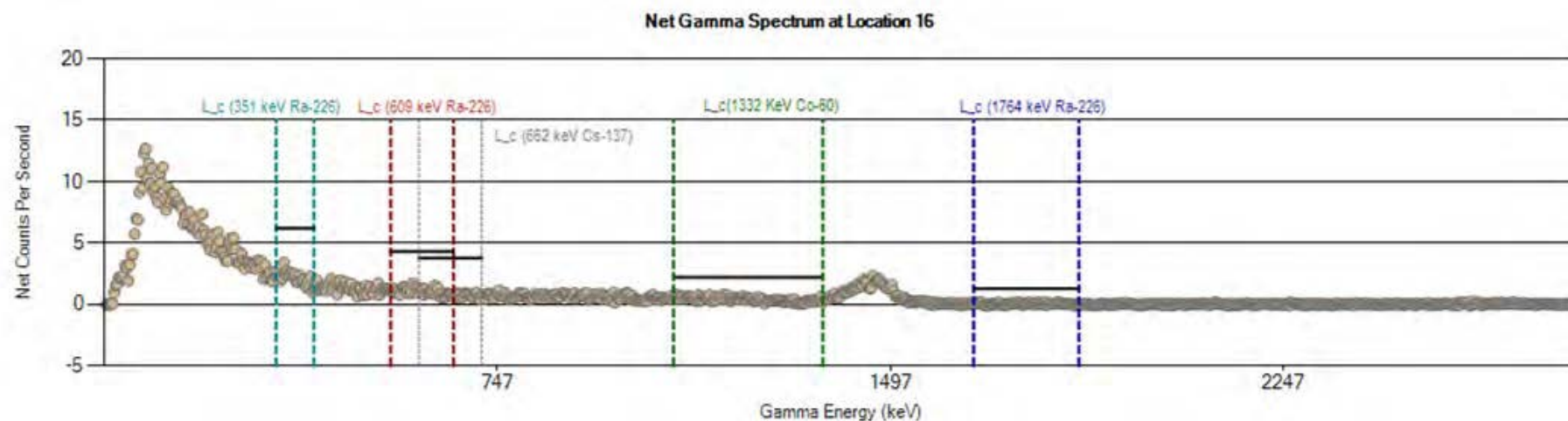
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Location 13 (cps)	1089	157	24	27	190	174	135	220	118	4471
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



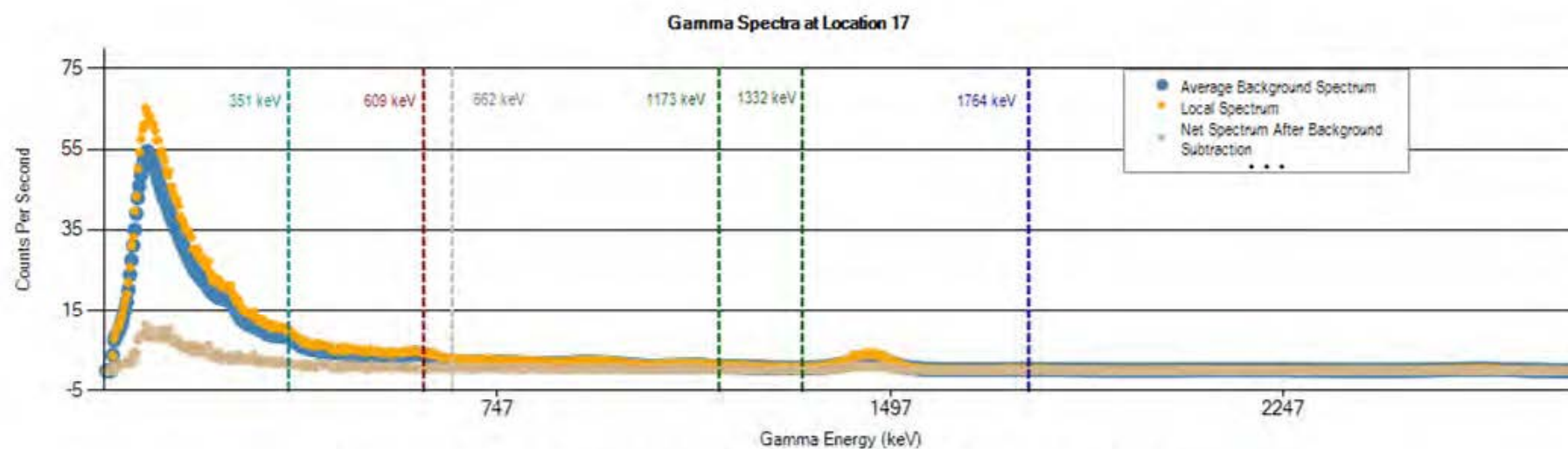
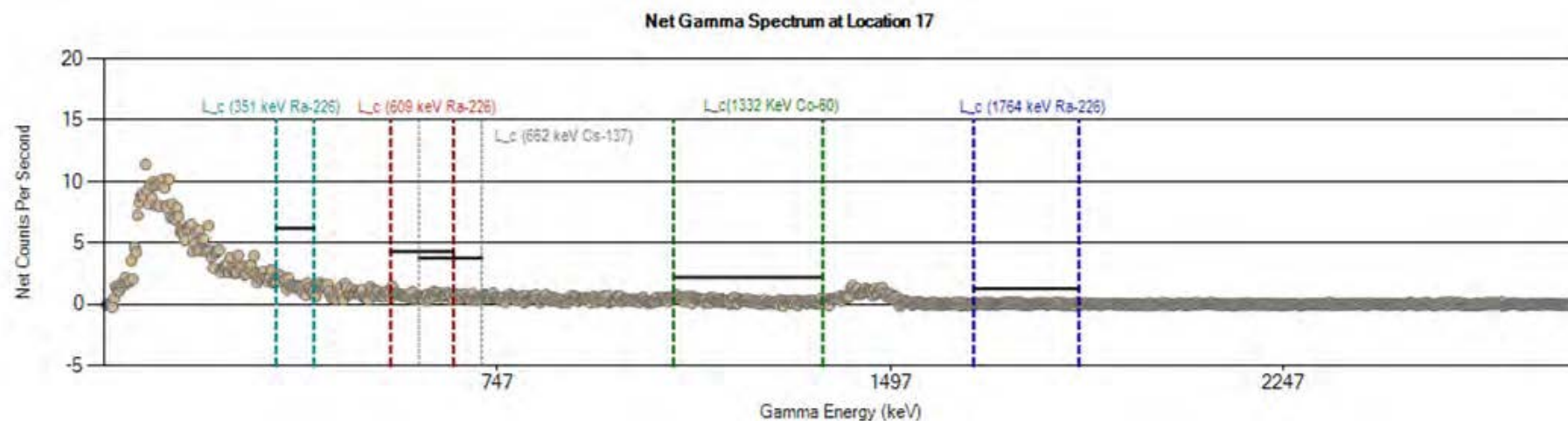
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 14 (cps)	1166	178	24	27	202	184	142	227	128	4621
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



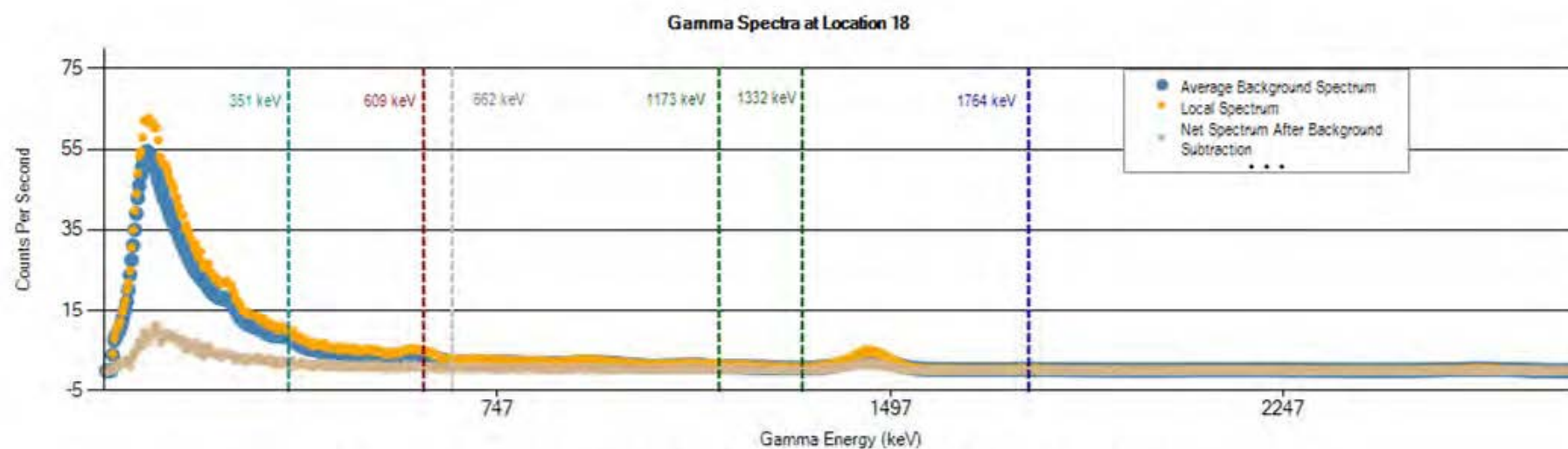
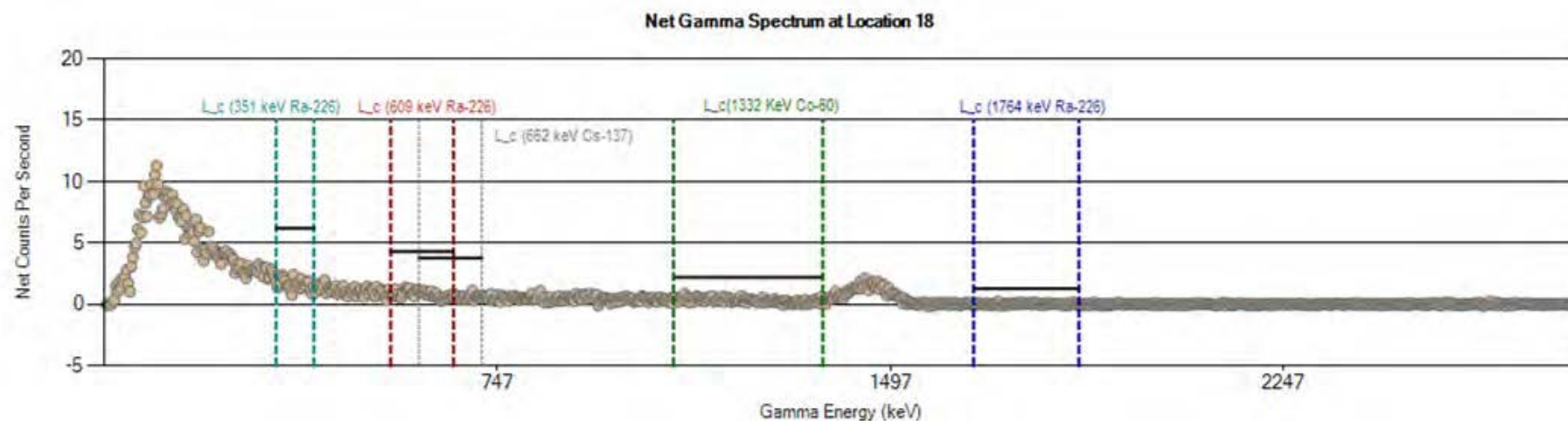
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 15 (cps)	1184	180	25	28	206	187	145	232	128	4714
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



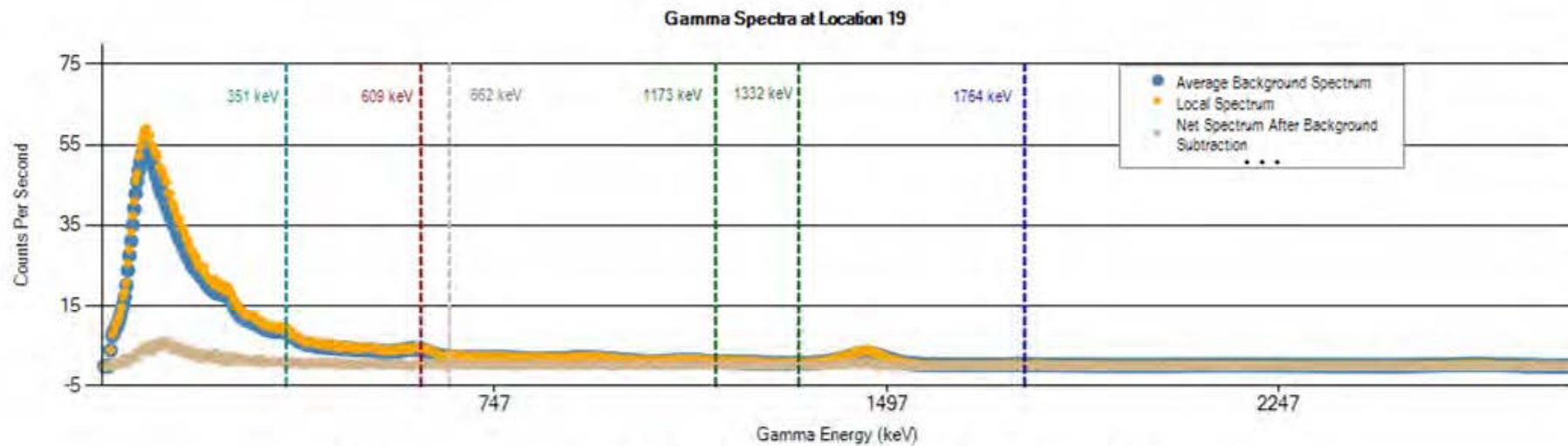
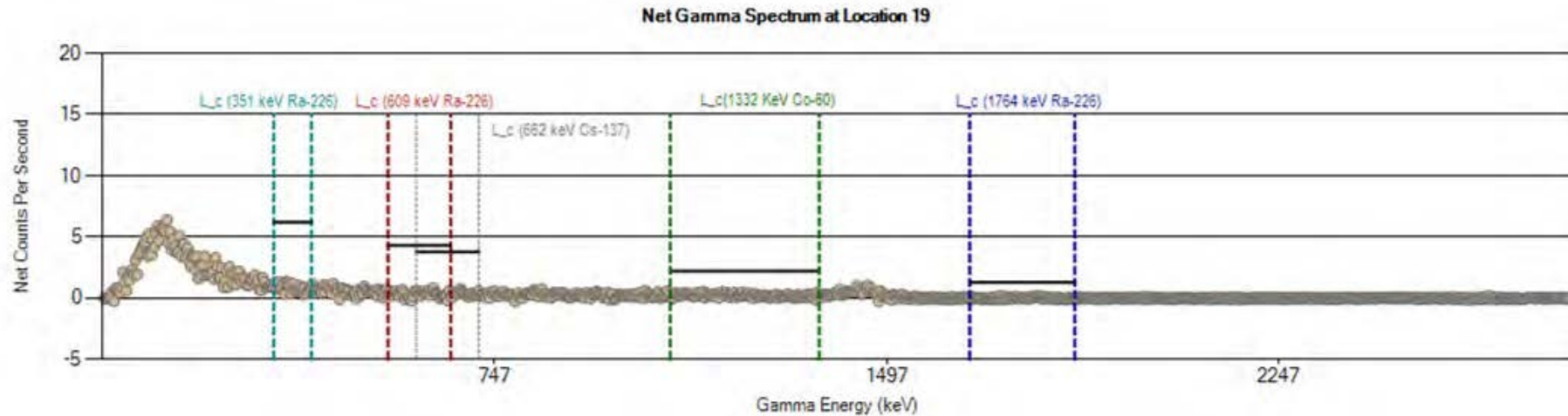
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 16 (cps)	1163	180	24	28	199	183	142	227	128	4558
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



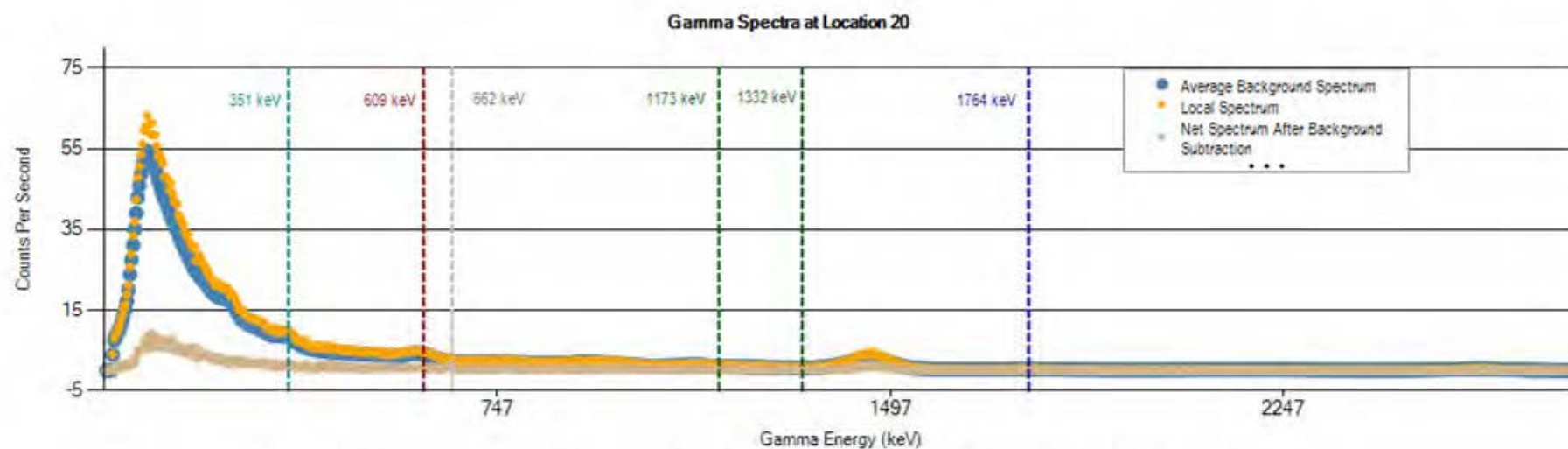
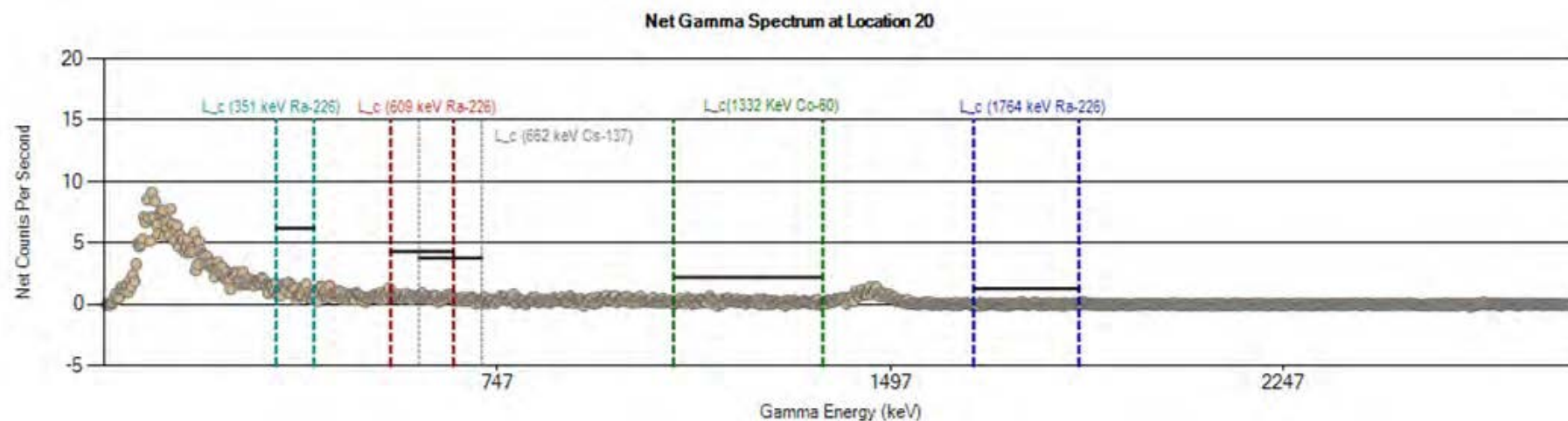
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Location 17 (cps)	1069	154	24	27	187	170	134	213	115	4361
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



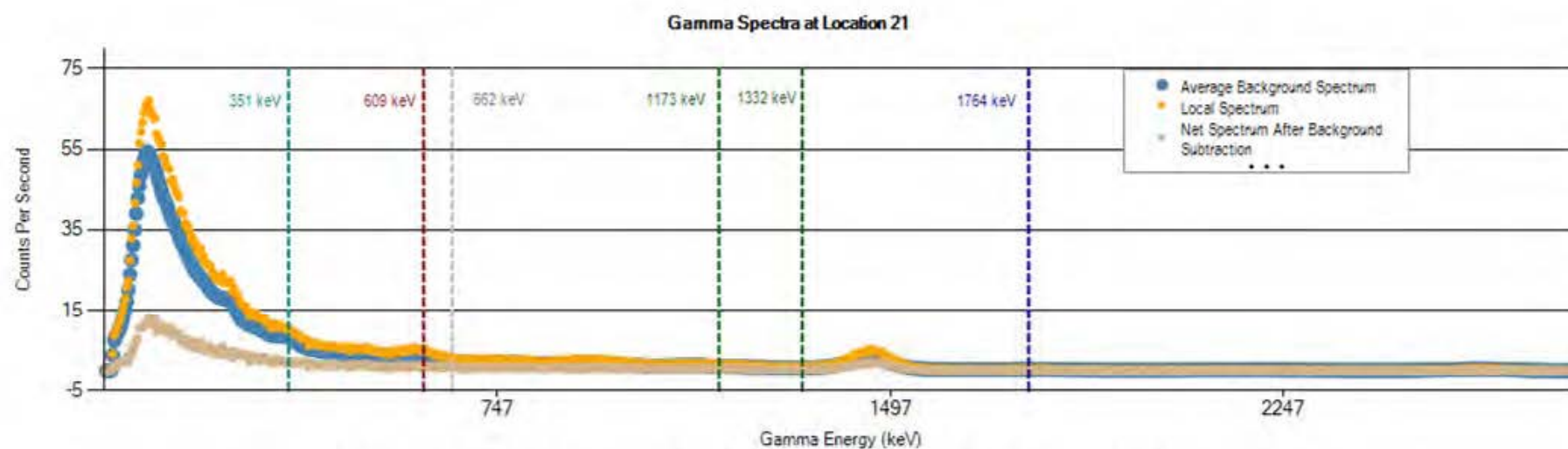
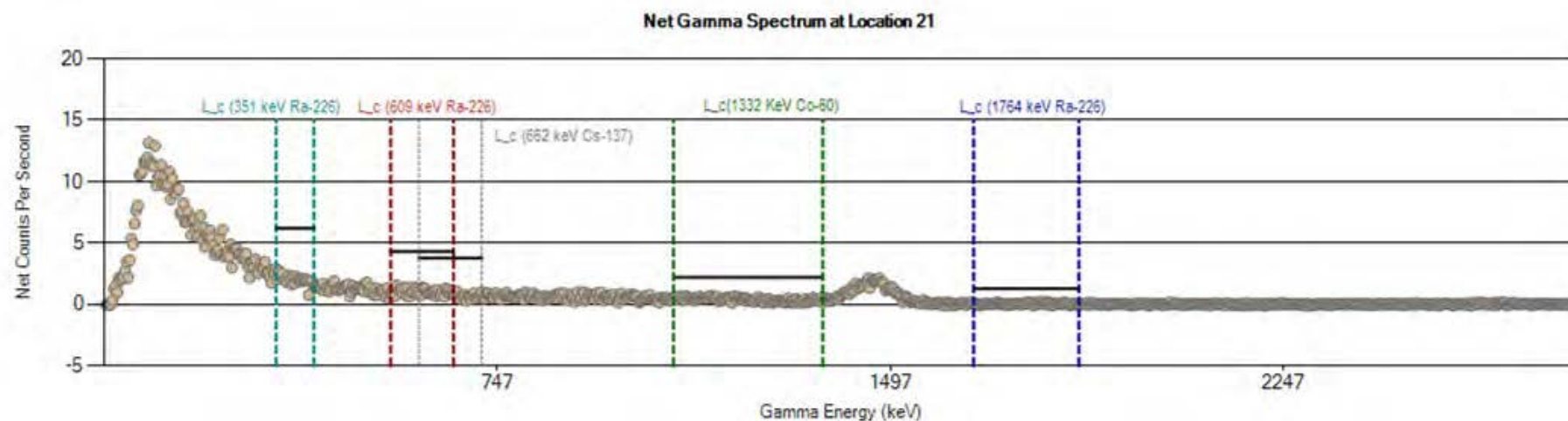
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 18 (cps)	1104	171	23	27	189	174	135	215	120	4412
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



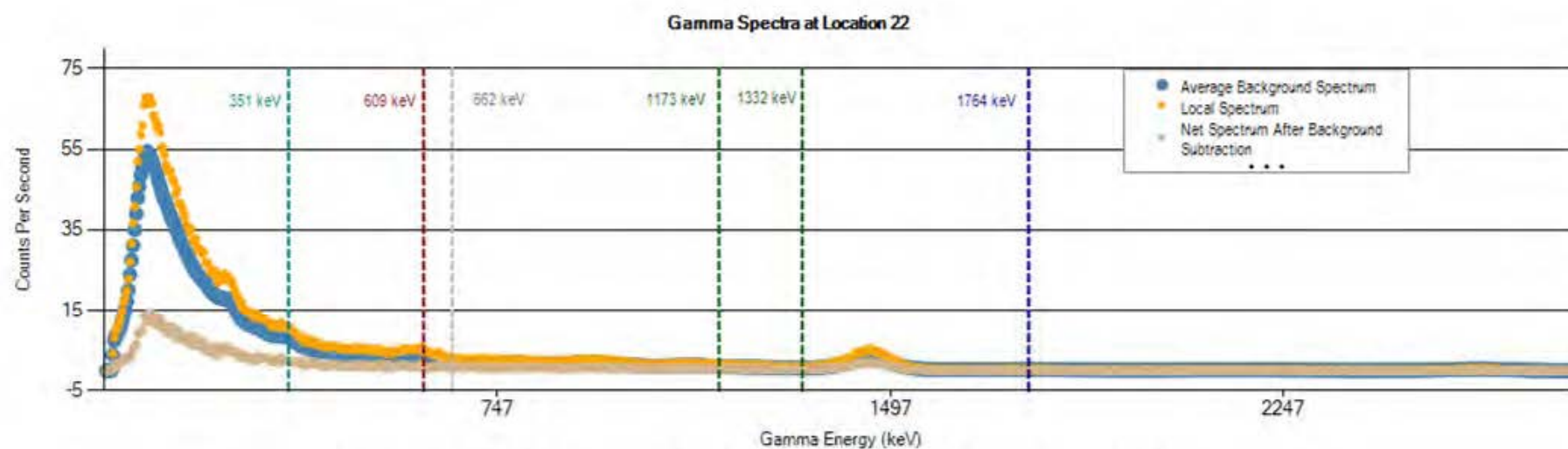
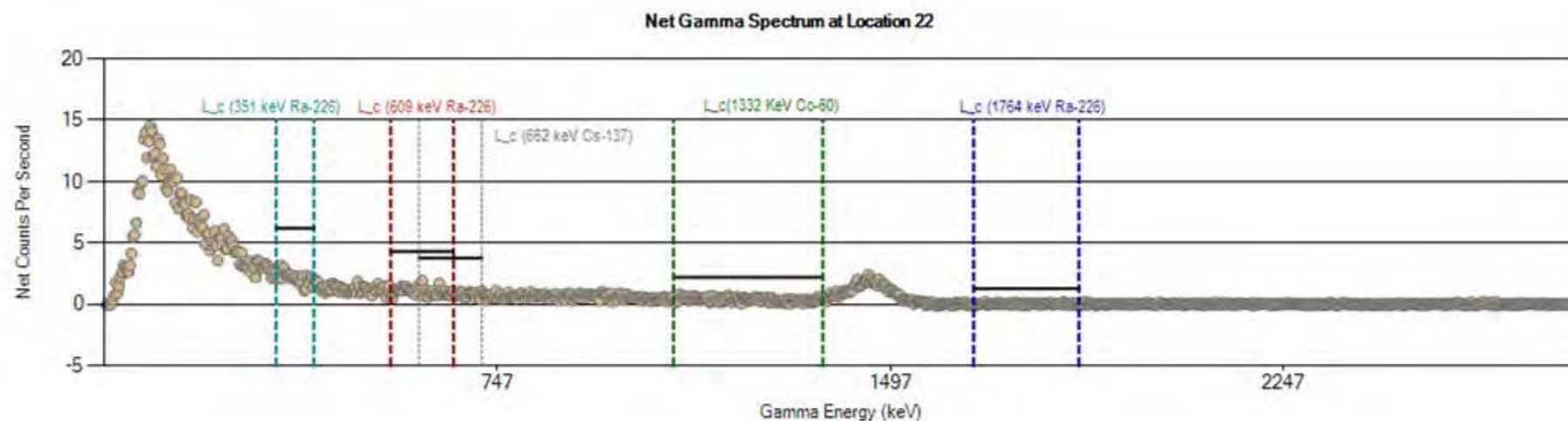
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 19 (cps)	973	135	21	24	170	154	122	196	110	4022
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



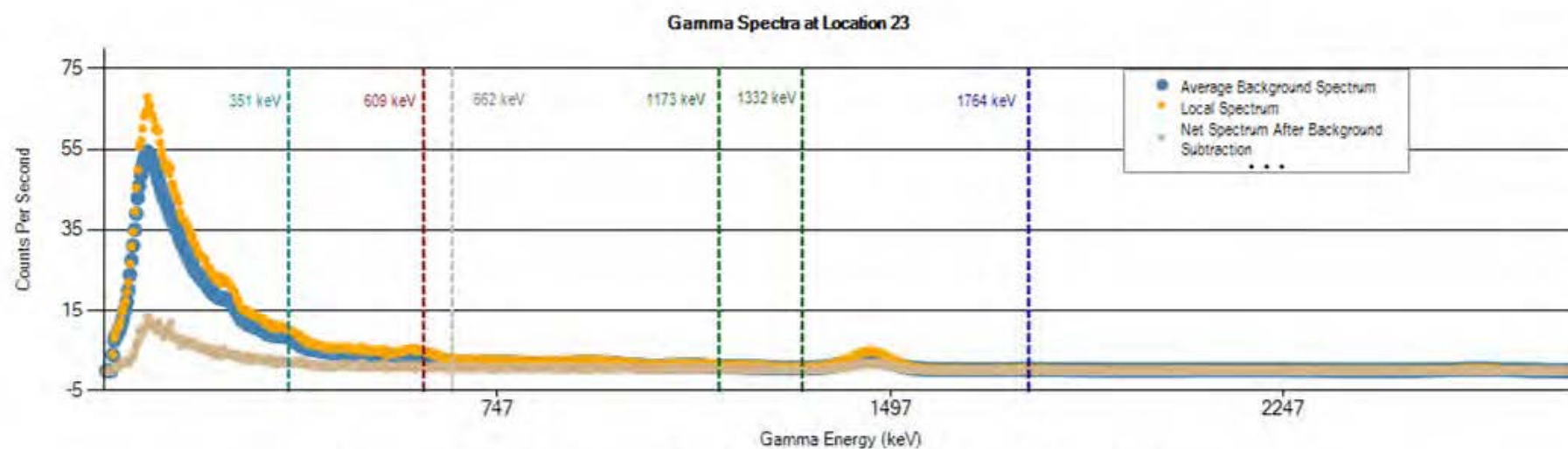
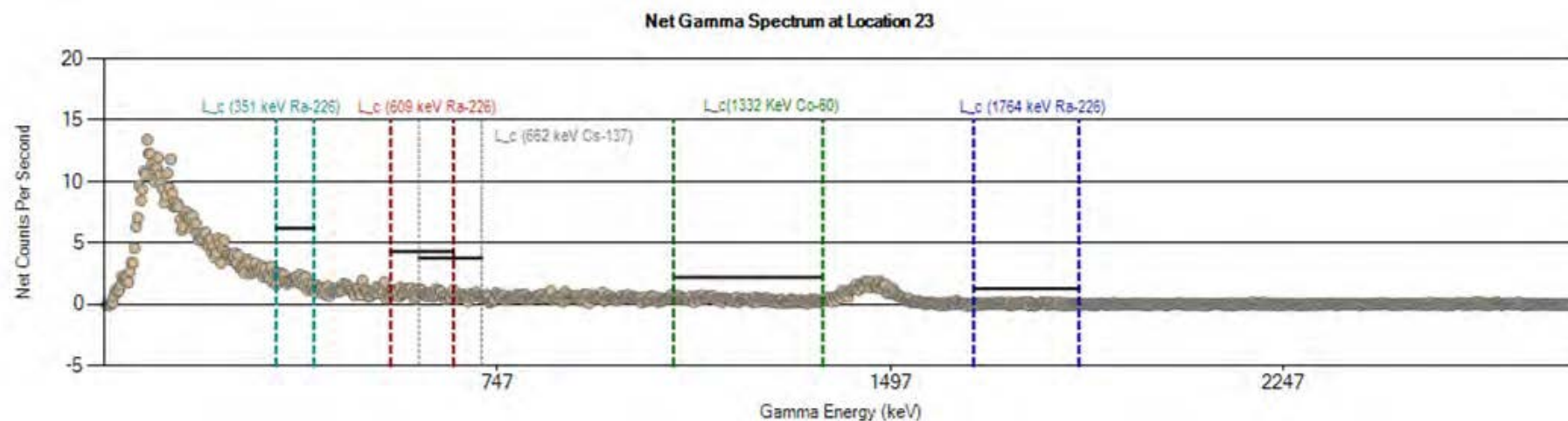
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 20 (cps)	1017	148	22	25	177	164	127	201	110	4172
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



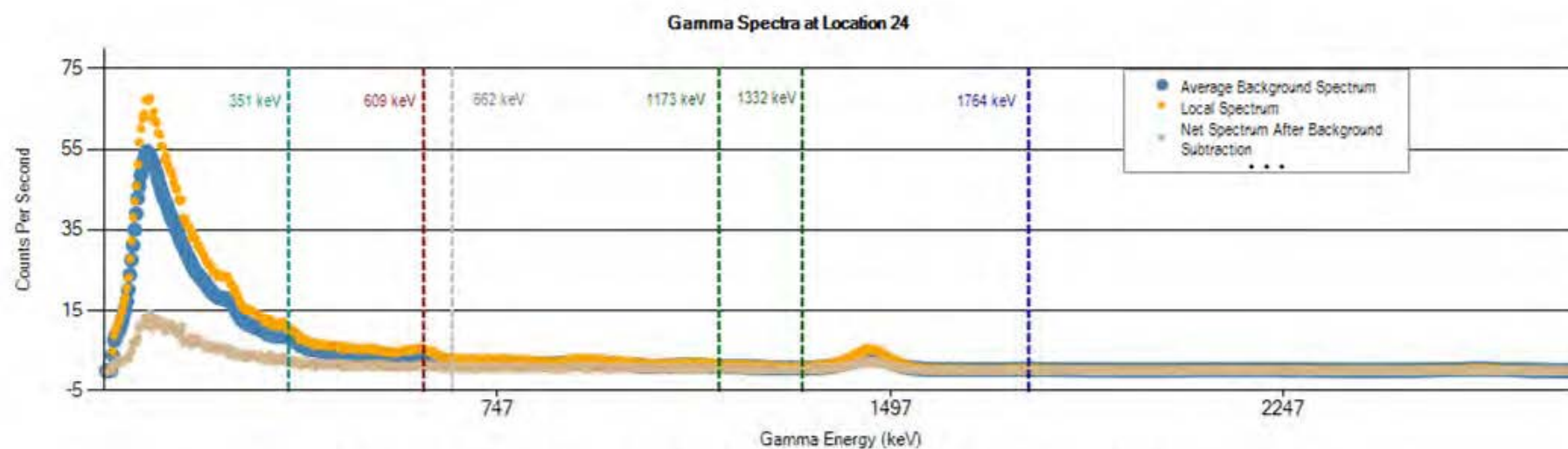
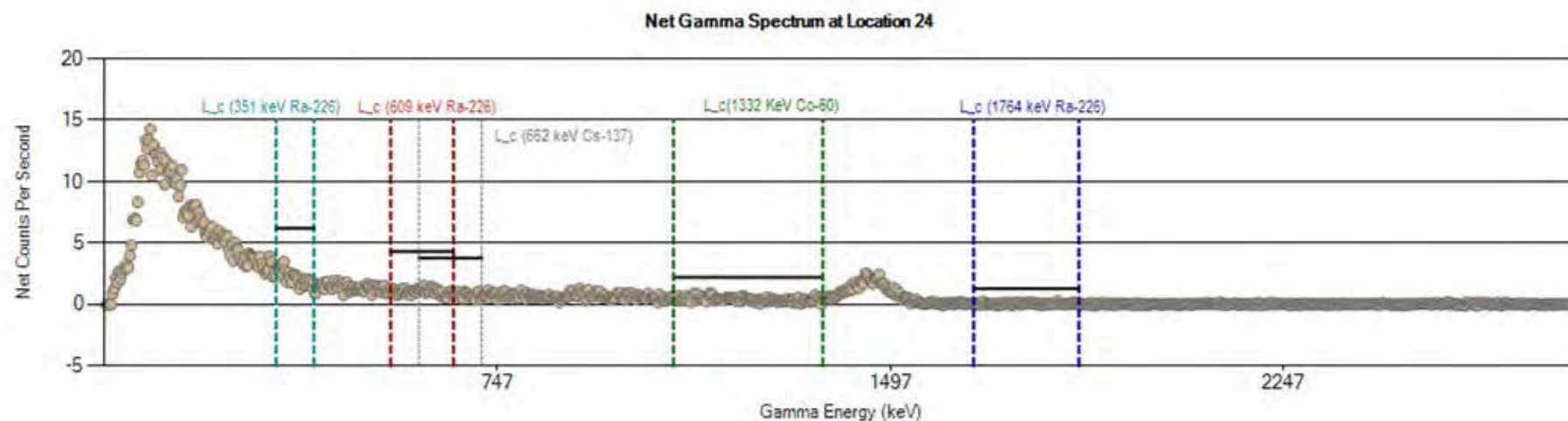
	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 21 (cps)	1153	180	24	28	197	183	142	224	127	4576
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 22 (cps)	1161	182	24	27	198	184	145	229	127	4623
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255



	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 23 (cps)	1127	174	24	28	194	177	139	222	124	4504
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255

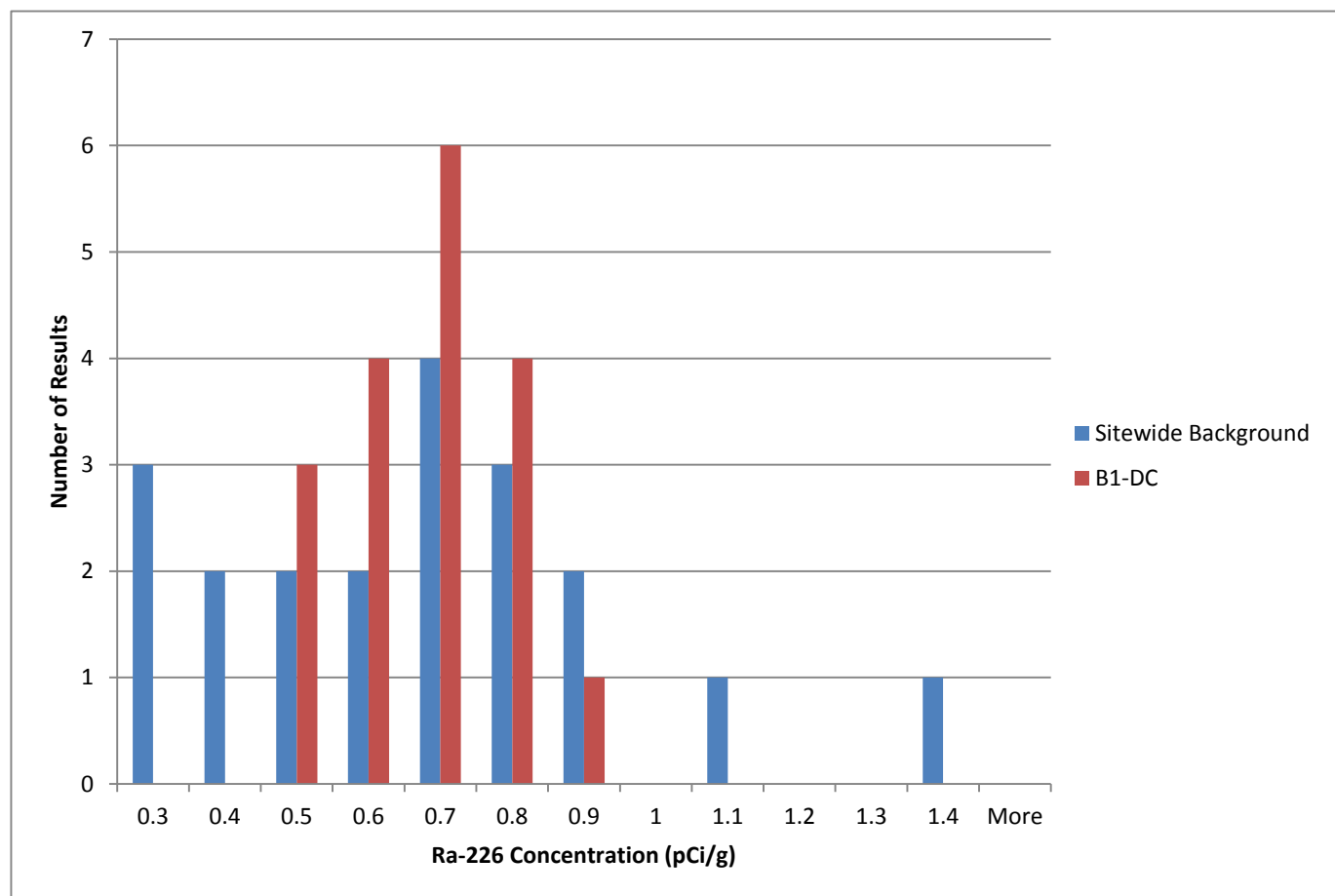


	ROI1	ROI2	ROI3	ROI4	ROI5	ROI6	ROI7	ROI8	ROI9	ROI10
Location 24 (cps)	1182	186	25	28	201	183	144	229	129	4672
Static IL (cps)	1052	150	35	41	201	189	146	229	120	4255

Histogram, RSY B1 (DC) vs. Sitewide Background

Background	
<i>Bin</i>	<i>Frequency</i>
0.3	3
0.4	2
0.5	2
0.6	2
0.7	4
0.8	3
0.9	2
1	0
1.1	1
1.2	0
1.3	0
1.4	1
More	0

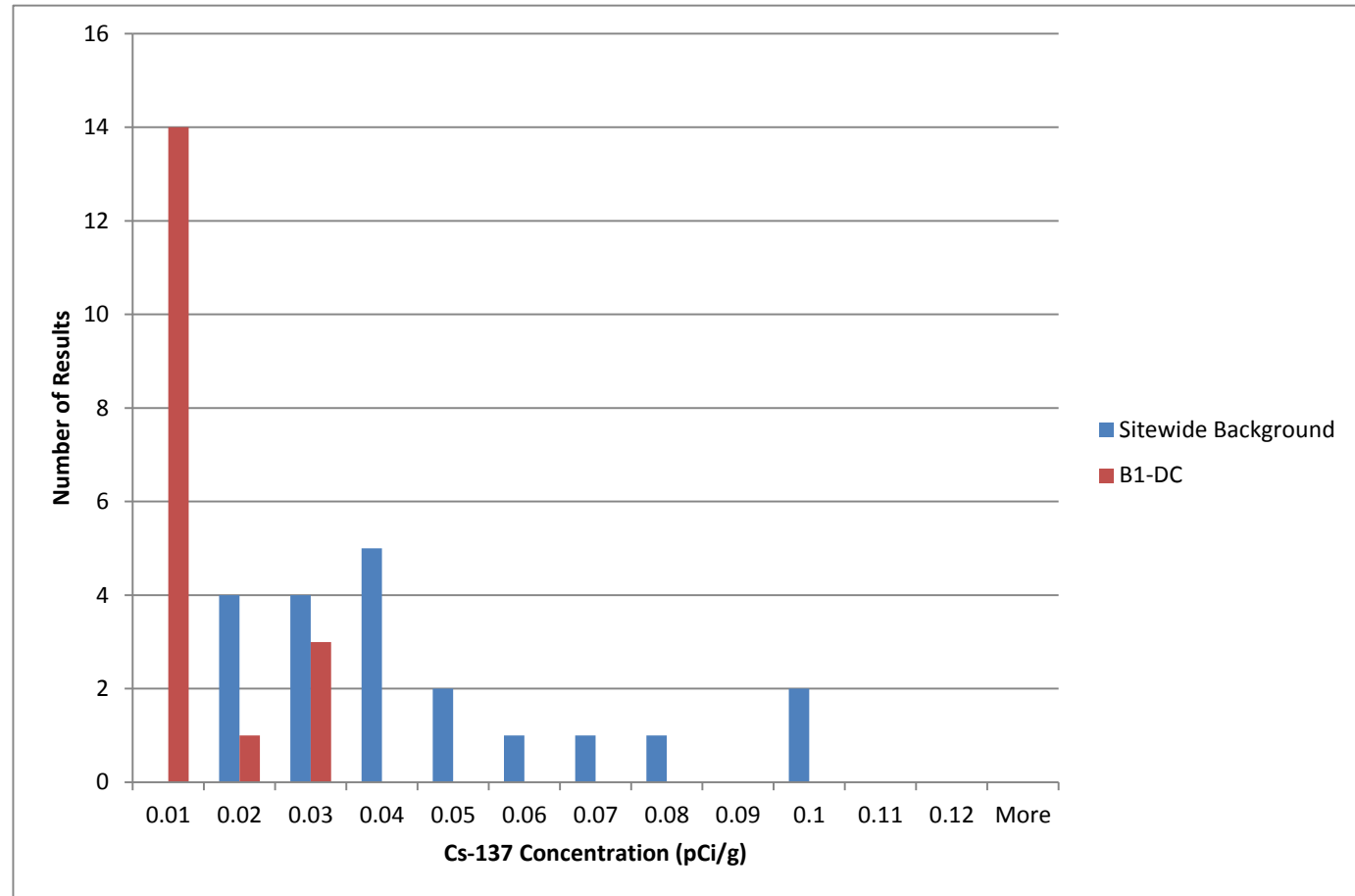
B1-DC	
<i>Bin</i>	<i>Frequency</i>
0.3	0
0.4	0
0.5	3
0.6	4
0.7	6
0.8	4
0.9	1
1	0
1.1	0
1.2	0
1.3	0
1.4	0
More	0



Histogram, RSY B1 (DC) vs. Sitewide Background

Background	
<i>Bin</i>	<i>Frequency</i>
0.01	0
0.02	4
0.03	4
0.04	5
0.05	2
0.06	1
0.07	1
0.08	1
0.09	0
0.1	2
0.11	0
0.12	0
More	0

B1-DC	
<i>Bin</i>	<i>Frequency</i>
0.01	14
0.02	1
0.03	3
0.04	0
0.05	0
0.06	0
0.07	0
0.08	0
0.09	0
0.1	0
0.11	0
0.12	0
More	0



TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

TestAmerica Job ID: 160-30101-2

Client Project/Site: Hunters Point Naval Shipyard - Parcel E2

For:

Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Eddie Kalombo

Micha Korinhizer

Authorized for release by:

9/6/2018 3:07:57 PM

Micha Korinhizer, Project Management Assistant II
(314)298-8566

micha.korinhizer@testamericainc.com

Designee for

Rhonda Ridenhower, Manager of Project Management
(314)298-8566

rhonda.ridenhower@testamericainc.com

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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30101-2

Job ID: 160-30101-2

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: Hunters Point Naval Shipyard - Parcel E2

Report Number: 160-30101-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client.

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

The following clean-up methods for Organic analyses may have been used on the samples in this data set. Specific methods employed are documented on the batch extraction logs:

Method 3600C: Cleanup
Method 3620C: Florisil Cleanup
Method 3630C: Silica Gel Cleanup
Method 3640A: Gel-Permeation Cleanup
Method 3650B: Acid-Base Partition Cleanup
Method 3660B: Sulfur Cleanup

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30101-2

Job ID: 160-30101-2 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

Method 3665A: Sulfuric Acid/Permanganate Cleanup

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 08/10/2018; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 20.0° C.

TOTAL BETA STRONTIUM (GFPC)

Samples PE2-RSYB1-DC-S001 (160-30101-1) and PE2-RSYB1-DC-S011 (160-30101-11) were analyzed for Total Beta Strontium (GFPC) in accordance with EPA 905. The samples were dried on 08/10/2018, prepared on 08/16/2018 and analyzed on 09/05/2018.

The following samples in batch 160-382925 could not be thoroughly homogenized before sub-sampling was performed due to sample matrix: PE2-RSYB1-DC-S001 (160-30101-1) and PE2-RSYB1-DC-S011 (160-30101-11). The samples contained detritus material and rocks of varying sizes.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Samples PE2-RSYB1-DC-S001 (160-30101-1), PE2-RSYB1-DC-S002 (160-30101-2), PE2-RSYB1-DC-S003 (160-30101-3), PE2-RSYB1-DC-S004 (160-30101-4), PE2-RSYB1-DC-S005 (160-30101-5), PE2-RSYB1-DC-S006 (160-30101-6), PE2-RSYB1-DC-S007 (160-30101-7), PE2-RSYB1-DC-S008 (160-30101-8), PE2-RSYB1-DC-S009 (160-30101-9), PE2-RSYB1-DC-S010 (160-30101-10), PE2-RSYB1-DC-S011 (160-30101-11), PE2-RSYB1-DC-S012 (160-30101-12), PE2-RSYB1-DC-S013 (160-30101-13), PE2-RSYB1-DC-S014 (160-30101-14), PE2-RSYB1-DC-S015 (160-30101-15), PE2-RSYB1-DC-S016 (160-30101-16), PE2-RSYB1-DC-S017 (160-30101-17) and PE2-RSYB1-DC-S018 (160-30101-18) were analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 08/10/2018, prepared on 08/13/2018 and analyzed on 09/03/2018.

The cesium-137 detection goal of 0.0700 pCi/g was not met for the following samples in batch 160-382045: PE2-RSYB1-DC-S001 (160-30101-1), PE2-RSYB1-DC-S005 (160-30101-5), PE2-RSYB1-DC-S009 (160-30101-9), PE2-RSYB1-DC-S011 (160-30101-11), PE2-RSYB1-DC-S014 (160-30101-14), PE2-RSYB1-DC-S015 (160-30101-15), PE2-RSYB1-DC-S016 (160-30101-16) and PE2-RSYB1-DC-S017 (160-30101-17) and PE2-RSYB1-DC-S001 (160-30101-1 DU). This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.



APTIM Federal Services, LLC

4005 Port Chicago Hwy
Concord, CA 94520

CHAIN OF CUSTODY

Ref. Document # PE2_RSYB1_DC#587

Page 1 of 2

Project Number: 500506

CTO-013 RSYB1 Deconstruction
Systematic

Project Name: HPNS - Parcel E-2

Purchase Order #: 202296

Shipment/Pickup Date: 8/9/18

Waybill Number: 12660545139764489

Lab Destination: TestAmerica (St. Louis Lab)

13715 Rider Trail North
Earth City, MO 63045

Lab Contact Name / ph. #: Rhonda Ridenhower (314) 298-8566

Project Manager: Nels Johnson

(Name & phone #)

Send Report To: Eddie Kalombo

Phone/Fax Number: 415-987-0760

Address: 4005 Port Chicago Hwy

City: Concord, CA, 94520

Sampler's Name(s): JOAQUIN RAMIREZ

Sample ID Number	Sample Description	Date	Time	Method	Matrix	# of containers	Preservative (water)
PE2-RSYB1-DC-S001	Parcel E-2 RSYB1 Deconstruction Systematic	8/2/18	1100	G	SO	1	16 oz. plastic jar
PE2-RSYB1-DC-S002	Parcel E-2 RSYB1 Deconstruction Systematic	8/2/18	1105	G	SO	1	16 oz. plastic jar
PE2-RSYB1-DC-S003	Parcel E-2 RSYB1 Deconstruction Systematic	8/2/18	1110	G	SO	1	16 oz. plastic jar
PE2-RSYB1-DC-S004	Parcel E-2 RSYB1 Deconstruction Systematic	8/2/18	1115	G	SO	1	16 oz. plastic jar
PE2-RSYB1-DC-S005	Parcel E-2 RSYB1 Deconstruction Systematic	8/2/18	1210	G	SO	1	16 oz. plastic jar
PE2-RSYB1-DC-S006	Parcel E-2 RSYB1 Deconstruction Systematic	8/2/18	1215	G	SO	1	16 oz. plastic jar
PE2-RSYB1-DC-S007	Parcel E-2 RSYB1 Deconstruction Systematic	8/2/18	1219	G	SO	1	16 oz. plastic jar
PE2-RSYB1-DC-S008	Parcel E-2 RSYB1 Deconstruction Systematic	8/2/18	1223	G	SO	1	16 oz. plastic jar
PE2-RSYB1-DC-S009	Parcel E-2 RSYB1 Deconstruction Systematic	8/2/18	1227	G	SO	1	16 oz. plastic jar
PE2-RSYB1-DC-S010	Parcel E-2 RSYB1 Deconstruction Systematic	8/2/18	1231	G	SO	1	16 oz. plastic jar

Special Instructions:

Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g.

7 days ingrown draft and follow with 21 days final.

<input type="checkbox"/> 24-hr		<input type="checkbox"/> 10-day		<input type="checkbox"/> 3-day		Level Of QC Required	
Standard TAT -10-day		I		II		Project Specific:	
Relinquished By: JOAQUIN RAMIREZ	Date: 8/2/18	Received By: M. HSEC CH	Date: 8/2/18	Project Specific:			
Relinquished By: M. HSEC CH	Date: 8/2/18	Received By: [Signature]	Date: 8/2/18	Project Specific:			
Relinquished By:	Date:	Received By:	Date:	Project Specific:			
Relinquished By:	Date:	Received By:	Date:	Project Specific:			

Method Codes		Matrix Codes	
C = Composite	G = Grab	DW = Drinking Water	SO = Soil
		GW = Ground Water	SL = Sludge
		WW = Waste Water	CP = Chip Samples
A = Air		ABS=Asbestos, PO=Pipe Opening	



160-30101 Chain of Custody



APTIM Federal Services, LLC
4005 Port Chicago Hwy
Concord, CA 94520

CHAIN OF CUSTODY

Ref. Document # PE2_RSYB1_DC#587
Page 2 of 2

Project Number: 500506

CTO-013 RSYB1 Deconstruction
Systematic

Project Name:

Project Location: HPNS - Parcel E-2

Purchase Order #: 202296

Shipment/Pickup Date: 8/1/18

Waybill Number: 126605451397646489

Lab Destination: TestAmerica (St. Louis Lab)

13715 Rider Trail North

Earth City, MO 63045

Lab Contact Name / ph. #: Rhonda Ridenhower (314) 298-8566

Project Manager: Nels Johnson

(Name & phone #)

Send Report To: Eddie Kalambo

Phone/Fax Number: 415-987-0760

Address: 4005 Port Chicago Hwy

City: Concord, CA, 94520

Sampler's Name(s): JOAQUIN RAMIREZ

Sample ID Number	Sample Description	Date	Time	Method	Matrix	# of containers	Preservative (water)	Preservative (soil)	Container Type	Gamma Spec (EPA 191.1 M) - (7 day in-growth preliminary results)	Total Strontium (EPA 905 MOD)	Strontium 90 (EPA 905 MOD)	Dose Rate $\mu\text{R/hr}$
PE2-RSYB1-DC-S011	Parcel E-2 RSYB1 Deconstruction Systematic	8/2/18	1235	G	SO	1	16 oz. plastic jar			X	X	X	5
PE2-RSYB1-DC-S012	Parcel E-2 RSYB1 Deconstruction Systematic	8/2/18	1239	G	SO	1	16 oz. plastic jar			X			5
PE2-RSYB1-DC-S013	Parcel E-2 RSYB1 Deconstruction Systematic	8/2/18	1243	G	SO	1	16 oz. plastic jar			X			5
PE2-RSYB1-DC-S014	Parcel E-2 RSYB1 Deconstruction Systematic	8/2/18	1247	G	SO	1	16 oz. plastic jar			X			5
PE2-RSYB1-DC-S015	Parcel E-2 RSYB1 Deconstruction Systematic	8/2/18	1251	G	SO	1	16 oz. plastic jar			X			5
PE2-RSYB1-DC-S016	Parcel E-2 RSYB1 Deconstruction Systematic	8/2/18	1255	G	SO	1	16 oz. plastic jar			X			5
PE2-RSYB1-DC-S017	Parcel E-2 RSYB1 Deconstruction Systematic	8/2/18	1259	G	SO	1	16 oz. plastic jar			X			5
PE2-RSYB1-DC-S018	Parcel E-2 RSYB1 Deconstruction Systematic	8/2/18	1302	G	SO	1	16 oz. plastic jar			X			5

Special Instructions:

7 days ingrown draft and follow with 21 days final.

Analyze for Total Strontium as a screening step, and isotopic Sr-90 only if Total Strontium is above project action limit of 0.331 pCi/g.

<input type="checkbox"/> 24-hr		<input type="checkbox"/> 10-day		<input type="checkbox"/> 3-day	
Standard TAT -10-day		Project Specific:		Method Codes	
Reinquired By:	Reinquired By:	Received By:	Received By:	C = Composite	G = Grab
JOAQUIN RAMIREZ	MINH SEC CHI	MINH SEC CHI	MINH SEC CHI		
Date: 8/2/18	Date: 8/2/18	Date: 8/2/18	Date: 8/2/18		
Time: 1400	Time: 1400	Time: 1400	Time: 1400		
Reinquired By:	Reinquired By:	Received By:	Received By:	Matrix Codes	
MINH SEC CHI	MINH SEC CHI	JOAQUIN RAMIREZ	JOAQUIN RAMIREZ	DW = Drinking Water	SO = Soil
Date: 8/2/18	Date: 8/2/18	Date: 8/2/18	Date: 8/2/18	GW = Ground Water	SL = Sludge
Time: 1000	Time: 1000	Time: 1000	Time: 1000	WW = Waste Water	CP = Chip Samples
Reinquired By:	Reinquired By:	Received By:	Received By:	A = Air	ABS=Asbestos, PO=Pipe Opening
Date:	Date:	Date:	Date:		
Time:	Time:	Time:	Time:		

Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-30101-2

Login Number: 30101**List Source: TestAmerica St. Louis****List Number: 1****Creator: Press, Nicholas B**

Question	Answer	Comment
Radioactivity wasn't checked or is \leq background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is $<6\text{mm}$ (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30101-2

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Method Summary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30101-2

Method	Method Description	Protocol	Laboratory
905.0	Total Beta Strontium (GFPC)	DOE	TAL SL
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
DPS-0	Preparation, Digestion/ Precipitate	None	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy

None = None

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30101-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-30101-1	PE2-RSYB1-DC-S001	Solid	08/02/18 11:00	08/10/18 08:30
160-30101-2	PE2-RSYB1-DC-S002	Solid	08/02/18 11:05	08/10/18 08:30
160-30101-3	PE2-RSYB1-DC-S003	Solid	08/02/18 11:10	08/10/18 08:30
160-30101-4	PE2-RSYB1-DC-S004	Solid	08/02/18 11:15	08/10/18 08:30
160-30101-5	PE2-RSYB1-DC-S005	Solid	08/02/18 12:10	08/10/18 08:30
160-30101-6	PE2-RSYB1-DC-S006	Solid	08/02/18 12:15	08/10/18 08:30
160-30101-7	PE2-RSYB1-DC-S007	Solid	08/02/18 12:19	08/10/18 08:30
160-30101-8	PE2-RSYB1-DC-S008	Solid	08/02/18 12:23	08/10/18 08:30
160-30101-9	PE2-RSYB1-DC-S009	Solid	08/02/18 12:27	08/10/18 08:30
160-30101-10	PE2-RSYB1-DC-S010	Solid	08/02/18 12:31	08/10/18 08:30
160-30101-11	PE2-RSYB1-DC-S011	Solid	08/02/18 12:35	08/10/18 08:30
160-30101-12	PE2-RSYB1-DC-S012	Solid	08/02/18 12:39	08/10/18 08:30
160-30101-13	PE2-RSYB1-DC-S013	Solid	08/02/18 12:43	08/10/18 08:30
160-30101-14	PE2-RSYB1-DC-S014	Solid	08/02/18 12:47	08/10/18 08:30
160-30101-15	PE2-RSYB1-DC-S015	Solid	08/02/18 12:51	08/10/18 08:30
160-30101-16	PE2-RSYB1-DC-S016	Solid	08/02/18 12:55	08/10/18 08:30
160-30101-17	PE2-RSYB1-DC-S017	Solid	08/02/18 12:59	08/10/18 08:30
160-30101-18	PE2-RSYB1-DC-S018	Solid	08/02/18 13:02	08/10/18 08:30

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30101-2

Client Sample ID: PE2-RSYB1-DC-S001

Date Collected: 08/02/18 11:00

Date Received: 08/10/18 08:30

Lab Sample ID: 160-30101-1

Matrix: Solid

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	-0.0133	U	0.0596	0.0596	0.331	0.0503	pCi/g	08/16/18 12:28	09/05/18 05:46	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	78.8		40 - 110					08/16/18 12:28	09/05/18 05:46	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.898		0.227	0.244		0.0843	pCi/g	08/13/18 13:36	09/03/18 20:24	1
Actinium-227	0.302	U	0.466	0.467		0.479	pCi/g	08/13/18 13:36	09/03/18 20:24	1
Bismuth-212	0.178	U	1.35	1.35		1.10	pCi/g	08/13/18 13:36	09/03/18 20:24	1
Bismuth-214	0.676		0.169	0.183		0.0499	pCi/g	08/13/18 13:36	09/03/18 20:24	1
Cesium-137	-0.0214	U	0.103	0.103	0.0700	0.0722	pCi/g	08/13/18 13:36	09/03/18 20:24	1
Cobalt-60	0.000104	U	0.000207	0.000207	0.200	0.0688	pCi/g	08/13/18 13:36	09/03/18 20:24	1
Lead-210	0.571	U	1.59	1.59		1.10	pCi/g	08/13/18 13:36	09/03/18 20:24	1
Lead-212	0.738		0.128	0.160		0.0542	pCi/g	08/13/18 13:36	09/03/18 20:24	1
Lead-214	0.716		0.179	0.194		0.0685	pCi/g	08/13/18 13:36	09/03/18 20:24	1
Potassium-40	14.7		2.14	2.62		0.353	pCi/g	08/13/18 13:36	09/03/18 20:24	1
Protactinium-231	0.763	U	2.22	2.23		2.42	pCi/g	08/13/18 13:36	09/03/18 20:24	1
Radium-226	0.676		0.169	0.183	0.700	0.0499	pCi/g	08/13/18 13:36	09/03/18 20:24	1
Radium-228	0.898		0.227	0.244		0.0843	pCi/g	08/13/18 13:36	09/03/18 20:24	1
Thallium-208	0.253		0.0849	0.0888		0.0282	pCi/g	08/13/18 13:36	09/03/18 20:24	1
Thorium-228	0.738		0.128	0.160		0.0542	pCi/g	08/13/18 13:36	09/03/18 20:24	1
Thorium-232	0.898		0.227	0.244		0.0843	pCi/g	08/13/18 13:36	09/03/18 20:24	1
Thorium-234	1.37		1.19	1.20		0.894	pCi/g	08/13/18 13:36	09/03/18 20:24	1
Uranium-235	0.124	U	0.360	0.360		0.290	pCi/g	08/13/18 13:36	09/03/18 20:24	1
Uranium-238	1.37		1.19	1.20		0.894	pCi/g	08/13/18 13:36	09/03/18 20:24	1

Client Sample ID: PE2-RSYB1-DC-S002

Date Collected: 08/02/18 11:05

Date Received: 08/10/18 08:30

Lab Sample ID: 160-30101-2

Matrix: Solid

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.250		0.219	0.220		0.114	pCi/g	08/13/18 13:36	09/03/18 20:23	1
Actinium-227	0.0691	U	0.724	0.724		0.593	pCi/g	08/13/18 13:36	09/03/18 20:23	1
Bismuth-212	-0.266	U	0.457	0.457		0.834	pCi/g	08/13/18 13:36	09/03/18 20:23	1
Bismuth-214	0.546		0.164	0.173		0.0556	pCi/g	08/13/18 13:36	09/03/18 20:23	1
Cesium-137	-0.00197	U	0.0750	0.0750	0.0700	0.0616	pCi/g	08/13/18 13:36	09/03/18 20:23	1
Cobalt-60	0.0246	U	0.0414	0.0415	0.200	0.0266	pCi/g	08/13/18 13:36	09/03/18 20:23	1
Lead-210	0.673	U	1.39	1.39		1.10	pCi/g	08/13/18 13:36	09/03/18 20:23	1
Lead-212	0.541		0.103	0.124		0.0427	pCi/g	08/13/18 13:36	09/03/18 20:23	1
Lead-214	0.531		0.127	0.139		0.0643	pCi/g	08/13/18 13:36	09/03/18 20:23	1
Potassium-40	9.64		1.63	1.90		0.297	pCi/g	08/13/18 13:36	09/03/18 20:23	1
Protactinium-231	0.000	U	0.554	0.554		2.36	pCi/g	08/13/18 13:36	09/03/18 20:23	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30101-2

Client Sample ID: PE2-RSYB1-DC-S002

Lab Sample ID: 160-30101-2

Date Collected: 08/02/18 11:05

Matrix: Solid

Date Received: 08/10/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.546		0.164	0.173	0.700	0.0556	pCi/g	08/13/18 13:36	09/03/18 20:23	1
Radium-228	0.250		0.219	0.220		0.114	pCi/g	08/13/18 13:36	09/03/18 20:23	1
Thallium-208	0.175		0.0634	0.0659		0.0241	pCi/g	08/13/18 13:36	09/03/18 20:23	1
Thorium-228	0.541		0.103	0.124		0.0427	pCi/g	08/13/18 13:36	09/03/18 20:23	1
Thorium-232	0.250		0.219	0.220		0.114	pCi/g	08/13/18 13:36	09/03/18 20:23	1
Thorium-234	-0.968	U	1.74	1.74		1.46	pCi/g	08/13/18 13:36	09/03/18 20:23	1
Uranium-235	0.0443	U	0.124	0.124		0.394	pCi/g	08/13/18 13:36	09/03/18 20:23	1
Uranium-238	-0.968	U	1.74	1.74		1.46	pCi/g	08/13/18 13:36	09/03/18 20:23	1

Client Sample ID: PE2-RSYB1-DC-S003

Lab Sample ID: 160-30101-3

Date Collected: 08/02/18 11:10

Matrix: Solid

Date Received: 08/10/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.908		0.196	0.216		0.0767	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Actinium-227	0.265	U	0.485	0.486		0.574	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Bismuth-212	0.442	U	0.871	0.872		0.692	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Bismuth-214	0.655		0.123	0.140		0.0403	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Cesium-137	-0.0304	U	0.0573	0.0574	0.0700	0.0450	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Cobalt-60	-0.0482	U	0.107	0.108	0.200	0.0518	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Lead-210	-0.547	U	1.48	1.48		1.35	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Lead-212	0.634		0.0925	0.124		0.0429	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Lead-214	0.697		0.124	0.143		0.0430	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Potassium-40	16.5		1.56	2.30		0.221	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Protactinium-231	0.330	U	1.34	1.34		2.08	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Radium-226	0.655		0.123	0.140	0.700	0.0403	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Radium-228	0.908		0.196	0.216		0.0767	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Thallium-208	0.238		0.0528	0.0583		0.0176	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Thorium-228	0.634		0.0925	0.124		0.0429	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Thorium-232	0.908		0.196	0.216		0.0767	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Thorium-234	0.529	U	1.37	1.37		1.11	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Uranium-235	0.104	U	0.199	0.199		0.398	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Uranium-238	0.529	U	1.37	1.37		1.11	pCi/g	08/13/18 13:36	09/03/18 20:51	1

Client Sample ID: PE2-RSYB1-DC-S004

Lab Sample ID: 160-30101-4

Date Collected: 08/02/18 11:15

Matrix: Solid

Date Received: 08/10/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	1.20		0.246	0.274		0.0353	pCi/g	08/13/18 13:36	09/03/18 20:52	1
Actinium-227	-0.482	U	1.14	1.14		0.924	pCi/g	08/13/18 13:36	09/03/18 20:52	1
Bismuth-212	0.165	U	1.06	1.06		0.859	pCi/g	08/13/18 13:36	09/03/18 20:52	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30101-2

Client Sample ID: PE2-RSYB1-DC-S004

Lab Sample ID: 160-30101-4

Date Collected: 08/02/18 11:15

Matrix: Solid

Date Received: 08/10/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Bismuth-214	0.631		0.168	0.179		0.0635	pCi/g	08/13/18 13:36	09/03/18 20:52	1
Cesium-137	0.0258	U	0.0804	0.0805	0.0700	0.0641	pCi/g	08/13/18 13:36	09/03/18 20:52	1
Cobalt-60	0.00471	U	0.114	0.114	0.200	0.0567	pCi/g	08/13/18 13:36	09/03/18 20:52	1
Lead-210	1.65		1.89	1.90		1.21	pCi/g	08/13/18 13:36	09/03/18 20:52	1
Lead-212	0.766		0.131	0.153		0.0631	pCi/g	08/13/18 13:36	09/03/18 20:52	1
Lead-214	0.693		0.147	0.163		0.0707	pCi/g	08/13/18 13:36	09/03/18 20:52	1
Potassium-40	19.2		2.19	2.92		0.391	pCi/g	08/13/18 13:36	09/03/18 20:52	1
Protactinium-231	-1.02	U	3.63	3.63		2.96	pCi/g	08/13/18 13:36	09/03/18 20:52	1
Radium-226	0.631		0.168	0.179	0.700	0.0635	pCi/g	08/13/18 13:36	09/03/18 20:52	1
Radium-228	1.20		0.246	0.274		0.0353	pCi/g	08/13/18 13:36	09/03/18 20:52	1
Thallium-208	0.278		0.0865	0.0910		0.0361	pCi/g	08/13/18 13:36	09/03/18 20:52	1
Thorium-228	0.766		0.131	0.153		0.0631	pCi/g	08/13/18 13:36	09/03/18 20:52	1
Thorium-232	1.20		0.246	0.274		0.0353	pCi/g	08/13/18 13:36	09/03/18 20:52	1
Thorium-234	0.0864	U	1.82	1.82		1.49	pCi/g	08/13/18 13:36	09/03/18 20:52	1
Uranium-235	-0.248	U	0.743	0.744		0.606	pCi/g	08/13/18 13:36	09/03/18 20:52	1
Uranium-238	0.0864	U	1.82	1.82		1.49	pCi/g	08/13/18 13:36	09/03/18 20:52	1

Client Sample ID: PE2-RSYB1-DC-S005

Lab Sample ID: 160-30101-5

Date Collected: 08/02/18 12:10

Matrix: Solid

Date Received: 08/10/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.980		0.240	0.260		0.0444	pCi/g	08/13/18 13:36	09/03/18 21:01	1
Actinium-227	0.0522	U	0.733	0.733		0.505	pCi/g	08/13/18 13:36	09/03/18 21:01	1
Bismuth-212	0.000	U	0.747	0.747		0.824	pCi/g	08/13/18 13:36	09/03/18 21:01	1
Bismuth-214	0.712		0.177	0.192		0.0521	pCi/g	08/13/18 13:36	09/03/18 21:01	1
Cesium-137	-0.0439	U	0.0603	0.0604	0.0700	0.0874	pCi/g	08/13/18 13:36	09/03/18 21:01	1
Cobalt-60	0.0217	U	0.0431	0.0431	0.200	0.0410	pCi/g	08/13/18 13:36	09/03/18 21:01	1
Lead-210	-0.0259	U	1.75	1.75		1.24	pCi/g	08/13/18 13:36	09/03/18 21:01	1
Lead-212	0.667		0.125	0.152		0.0545	pCi/g	08/13/18 13:36	09/03/18 21:01	1
Lead-214	0.611		0.147	0.160		0.0477	pCi/g	08/13/18 13:36	09/03/18 21:01	1
Potassium-40	12.2		1.99	2.35		0.364	pCi/g	08/13/18 13:36	09/03/18 21:01	1
Protactinium-231	0.0000001	U	3.14	3.14		2.58	pCi/g	08/13/18 13:36	09/03/18 21:01	1
Radium-226	0.712		0.177	0.192	0.700	0.0521	pCi/g	08/13/18 13:36	09/03/18 21:01	1
Radium-228	0.980		0.240	0.260		0.0444	pCi/g	08/13/18 13:36	09/03/18 21:01	1
Thallium-208	0.185		0.0840	0.0862		0.0363	pCi/g	08/13/18 13:36	09/03/18 21:01	1
Thorium-228	0.667		0.125	0.152		0.0545	pCi/g	08/13/18 13:36	09/03/18 21:01	1
Thorium-232	0.980		0.240	0.260		0.0444	pCi/g	08/13/18 13:36	09/03/18 21:01	1
Thorium-234	0.0750	U	1.46	1.46		1.02	pCi/g	08/13/18 13:36	09/03/18 21:01	1
Uranium-235	-0.0366	U	0.0549	0.0550		0.377	pCi/g	08/13/18 13:36	09/03/18 21:01	1
Uranium-238	0.0750	U	1.46	1.46		1.02	pCi/g	08/13/18 13:36	09/03/18 21:01	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30101-2

Client Sample ID: PE2-RSYB1-DC-S006

Lab Sample ID: 160-30101-6

Date Collected: 08/02/18 12:15

Matrix: Solid

Date Received: 08/10/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.750		0.229	0.241		0.118	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Actinium-227	0.0182	U	0.918	0.918		0.755	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Bismuth-212	0.317	U	0.677	0.678		0.524	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Bismuth-214	0.759		0.153	0.172		0.0303	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Cesium-137	0.0135	U	0.0630	0.0630	0.0700	0.0506	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Cobalt-60	0.00669	U	0.0572	0.0572	0.200	0.0278	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Lead-210	0.635	U	1.66	1.66		1.13	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Lead-212	0.592		0.109	0.125		0.0535	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Lead-214	0.517		0.116	0.127		0.0634	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Potassium-40	13.9		1.68	2.19		0.118	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Protactinium-231	-0.944	U	2.88	2.88		2.34	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Radium-226	0.759		0.153	0.172	0.700	0.0303	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Radium-228	0.750		0.229	0.241		0.118	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Thallium-208	0.253		0.0882	0.0919		0.0338	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Thorium-228	0.592		0.109	0.125		0.0535	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Thorium-232	0.750		0.229	0.241		0.118	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Thorium-234	-0.0802	U	1.70	1.70		1.40	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Uranium-235	0.104	U	0.268	0.269		0.479	pCi/g	08/13/18 13:36	09/03/18 20:51	1
Uranium-238	-0.0802	U	1.70	1.70		1.40	pCi/g	08/13/18 13:36	09/03/18 20:51	1

Client Sample ID: PE2-RSYB1-DC-S007

Lab Sample ID: 160-30101-7

Date Collected: 08/02/18 12:19

Matrix: Solid

Date Received: 08/10/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.633		0.156	0.169		0.0223	pCi/g	08/13/18 13:36	09/03/18 21:24	1
Actinium-227	-0.0355	U	0.0930	0.0931		0.601	pCi/g	08/13/18 13:36	09/03/18 21:24	1
Bismuth-212	0.232	U	0.621	0.622		0.492	pCi/g	08/13/18 13:36	09/03/18 21:24	1
Bismuth-214	0.596		0.127	0.141		0.0471	pCi/g	08/13/18 13:36	09/03/18 21:24	1
Cesium-137	0.000	U	0.0102	0.0102	0.0700	0.0417	pCi/g	08/13/18 13:36	09/03/18 21:24	1
Cobalt-60	0.0172	U	0.0295	0.0295	0.200	0.0295	pCi/g	08/13/18 13:36	09/03/18 21:24	1
Lead-210	0.664	U	1.56	1.56		1.26	pCi/g	08/13/18 13:36	09/03/18 21:24	1
Lead-212	0.601		0.0927	0.121		0.0428	pCi/g	08/13/18 13:36	09/03/18 21:24	1
Lead-214	0.627		0.111	0.129		0.0645	pCi/g	08/13/18 13:36	09/03/18 21:24	1
Potassium-40	13.7		1.56	2.09		0.324	pCi/g	08/13/18 13:36	09/03/18 21:24	1
Protactinium-231	0.292	U	1.35	1.35		2.09	pCi/g	08/13/18 13:36	09/03/18 21:24	1
Radium-226	0.596		0.127	0.141	0.700	0.0471	pCi/g	08/13/18 13:36	09/03/18 21:24	1
Radium-228	0.633		0.156	0.169		0.0223	pCi/g	08/13/18 13:36	09/03/18 21:24	1
Thallium-208	0.293		0.0568	0.0644		0.0143	pCi/g	08/13/18 13:36	09/03/18 21:24	1
Thorium-228	0.601		0.0927	0.121		0.0428	pCi/g	08/13/18 13:36	09/03/18 21:24	1
Thorium-232	0.633		0.156	0.169		0.0223	pCi/g	08/13/18 13:36	09/03/18 21:24	1
Thorium-234	-0.167	U	1.35	1.35		1.11	pCi/g	08/13/18 13:36	09/03/18 21:24	1
Uranium-235	0.0512	U	0.208	0.208		0.380	pCi/g	08/13/18 13:36	09/03/18 21:24	1
Uranium-238	-0.167	U	1.35	1.35		1.11	pCi/g	08/13/18 13:36	09/03/18 21:24	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30101-2

Client Sample ID: PE2-RSYB1-DC-S008

Lab Sample ID: 160-30101-8

Date Collected: 08/02/18 12:23

Matrix: Solid

Date Received: 08/10/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.876		0.213	0.230		0.0317	pCi/g	08/13/18 13:36	09/03/18 21:23	1
Actinium-227	-0.429	U	1.08	1.08		0.874	pCi/g	08/13/18 13:36	09/03/18 21:23	1
Bismuth-212	1.49		0.624	0.642		0.194	pCi/g	08/13/18 13:36	09/03/18 21:23	1
Bismuth-214	0.642		0.152	0.166		0.0460	pCi/g	08/13/18 13:36	09/03/18 21:23	1
Cesium-137	0.00703	U	0.0650	0.0650	0.0700	0.0529	pCi/g	08/13/18 13:36	09/03/18 21:23	1
Cobalt-60	-0.0157	U	0.103	0.103	0.200	0.0504	pCi/g	08/13/18 13:36	09/03/18 21:23	1
Lead-210	0.596	U	2.12	2.12		1.71	pCi/g	08/13/18 13:36	09/03/18 21:23	1
Lead-212	0.684		0.117	0.137		0.0553	pCi/g	08/13/18 13:36	09/03/18 21:23	1
Lead-214	0.555		0.150	0.160		0.0652	pCi/g	08/13/18 13:36	09/03/18 21:23	1
Potassium-40	15.3		1.80	2.37		0.123	pCi/g	08/13/18 13:36	09/03/18 21:23	1
Protactinium-231	-0.987	U	3.73	3.73		3.05	pCi/g	08/13/18 13:36	09/03/18 21:23	1
Radium-226	0.642		0.152	0.166	0.700	0.0460	pCi/g	08/13/18 13:36	09/03/18 21:23	1
Radium-228	0.876		0.213	0.230		0.0317	pCi/g	08/13/18 13:36	09/03/18 21:23	1
Thallium-208	0.274		0.0829	0.0874		0.0326	pCi/g	08/13/18 13:36	09/03/18 21:23	1
Thorium-228	0.684		0.117	0.137		0.0553	pCi/g	08/13/18 13:36	09/03/18 21:23	1
Thorium-232	0.876		0.213	0.230		0.0317	pCi/g	08/13/18 13:36	09/03/18 21:23	1
Thorium-234	1.79		1.25	1.27		0.800	pCi/g	08/13/18 13:36	09/03/18 21:23	1
Uranium-235	0.0597	U	0.266	0.266		0.553	pCi/g	08/13/18 13:36	09/03/18 21:23	1
Uranium-238	1.79		1.25	1.27		0.800	pCi/g	08/13/18 13:36	09/03/18 21:23	1

Client Sample ID: PE2-RSYB1-DC-S009

Lab Sample ID: 160-30101-9

Date Collected: 08/02/18 12:27

Matrix: Solid

Date Received: 08/10/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.771		0.192	0.208		0.0562	pCi/g	08/13/18 13:36	09/03/18 21:25	1
Actinium-227	0.401	U	1.03	1.03		0.836	pCi/g	08/13/18 13:36	09/03/18 21:25	1
Bismuth-212	0.623	U	1.08	1.08		0.839	pCi/g	08/13/18 13:36	09/03/18 21:25	1
Bismuth-214	0.813		0.177	0.195		0.0571	pCi/g	08/13/18 13:36	09/03/18 21:25	1
Cesium-137	-0.0574	U	0.0976	0.0978	0.0700	0.0764	pCi/g	08/13/18 13:36	09/03/18 21:25	1
Cobalt-60	0.0815		0.0446	0.0454	0.200	0.0138	pCi/g	08/13/18 13:36	09/03/18 21:25	1
Lead-210	1.46		1.99	2.00		1.26	pCi/g	08/13/18 13:36	09/03/18 21:25	1
Lead-212	0.710		0.129	0.149		0.0651	pCi/g	08/13/18 13:36	09/03/18 21:25	1
Lead-214	0.797		0.167	0.185		0.0645	pCi/g	08/13/18 13:36	09/03/18 21:25	1
Potassium-40	17.6		2.25	2.87		0.523	pCi/g	08/13/18 13:36	09/03/18 21:25	1
Protactinium-231	0.000	U	0.323	0.323		3.00	pCi/g	08/13/18 13:36	09/03/18 21:25	1
Radium-226	0.813		0.177	0.195	0.700	0.0571	pCi/g	08/13/18 13:36	09/03/18 21:25	1
Radium-228	0.771		0.192	0.208		0.0562	pCi/g	08/13/18 13:36	09/03/18 21:25	1
Thallium-208	0.337		0.0880	0.0944		0.0307	pCi/g	08/13/18 13:36	09/03/18 21:25	1
Thorium-228	0.710		0.129	0.149		0.0651	pCi/g	08/13/18 13:36	09/03/18 21:25	1
Thorium-232	0.771		0.192	0.208		0.0562	pCi/g	08/13/18 13:36	09/03/18 21:25	1
Thorium-234	0.526	U	0.628	0.631		0.839	pCi/g	08/13/18 13:36	09/03/18 21:25	1
Uranium-235	-0.0366	U	0.0688	0.0689		0.672	pCi/g	08/13/18 13:36	09/03/18 21:25	1
Uranium-238	0.526	U	0.628	0.631		0.839	pCi/g	08/13/18 13:36	09/03/18 21:25	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30101-2

Client Sample ID: PE2-RSYB1-DC-S010

Lab Sample ID: 160-30101-10

Date Collected: 08/02/18 12:31

Matrix: Solid

Date Received: 08/10/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.394		0.172	0.177		0.174	pCi/g	08/13/18 13:36	09/03/18 21:41	1
Actinium-227	0.274	U	0.606	0.607		0.404	pCi/g	08/13/18 13:36	09/03/18 21:41	1
Bismuth-212	0.470	U	0.993	0.995		0.774	pCi/g	08/13/18 13:36	09/03/18 21:41	1
Bismuth-214	0.499		0.155	0.164		0.0478	pCi/g	08/13/18 13:36	09/03/18 21:41	1
Cesium-137	0.0170	U	0.0824	0.0824	0.0700	0.0662	pCi/g	08/13/18 13:36	09/03/18 21:41	1
Cobalt-60	0.0169	U	0.0688	0.0688	0.200	0.0371	pCi/g	08/13/18 13:36	09/03/18 21:41	1
Lead-210	0.257	U	1.03	1.04		0.763	pCi/g	08/13/18 13:36	09/03/18 21:41	1
Lead-212	0.502		0.101	0.120		0.0407	pCi/g	08/13/18 13:36	09/03/18 21:41	1
Lead-214	0.580		0.122	0.136		0.0478	pCi/g	08/13/18 13:36	09/03/18 21:41	1
Potassium-40	8.69		1.77	1.98		0.499	pCi/g	08/13/18 13:36	09/03/18 21:41	1
Protactinium-231	0.851	U	2.02	2.02		2.22	pCi/g	08/13/18 13:36	09/03/18 21:41	1
Radium-226	0.499		0.155	0.164	0.700	0.0478	pCi/g	08/13/18 13:36	09/03/18 21:41	1
Radium-228	0.394		0.172	0.177		0.174	pCi/g	08/13/18 13:36	09/03/18 21:41	1
Thallium-208	0.211		0.0905	0.0931		0.0380	pCi/g	08/13/18 13:36	09/03/18 21:41	1
Thorium-228	0.502		0.101	0.120		0.0407	pCi/g	08/13/18 13:36	09/03/18 21:41	1
Thorium-232	0.394		0.172	0.177		0.174	pCi/g	08/13/18 13:36	09/03/18 21:41	1
Thorium-234	-0.530	U	0.739	0.741		0.936	pCi/g	08/13/18 13:36	09/03/18 21:41	1
Uranium-235	0.0168	U	0.165	0.165		0.320	pCi/g	08/13/18 13:36	09/03/18 21:41	1
Uranium-238	-0.530	U	0.739	0.741		0.936	pCi/g	08/13/18 13:36	09/03/18 21:41	1

Client Sample ID: PE2-RSYB1-DC-S011

Lab Sample ID: 160-30101-11

Date Collected: 08/02/18 12:35

Matrix: Solid

Date Received: 08/10/18 08:30

Method: 905.0 - Total Beta Strontium (GFPC)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	0.0379	U	0.0663	0.0663	0.331	0.0509	pCi/g	08/16/18 12:28	09/05/18 05:46	1
Carrier	%Yield	Qualifier	Limits					Prepared	Analyzed	Dil Fac
Sr Carrier	73.3		40 - 110					08/16/18 12:28	09/05/18 05:46	1

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.708		0.225	0.237		0.138	pCi/g	08/13/18 13:36	09/03/18 21:42	1
Actinium-227	-0.0654	U	0.119	0.119		0.893	pCi/g	08/13/18 13:36	09/03/18 21:42	1
Bismuth-212	0.642	U	1.16	1.16		0.909	pCi/g	08/13/18 13:36	09/03/18 21:42	1
Bismuth-214	0.662		0.144	0.159		0.0334	pCi/g	08/13/18 13:36	09/03/18 21:42	1
Cesium-137	0.0286	U	0.0964	0.0964	0.0700	0.0770	pCi/g	08/13/18 13:36	09/03/18 21:42	1
Cobalt-60	-0.0180	U	0.0977	0.0977	0.200	0.0552	pCi/g	08/13/18 13:36	09/03/18 21:42	1
Lead-210	-1.10	U	0.969	0.978		1.71	pCi/g	08/13/18 13:36	09/03/18 21:42	1
Lead-212	0.650		0.116	0.143		0.0529	pCi/g	08/13/18 13:36	09/03/18 21:42	1
Lead-214	0.645		0.117	0.135		0.0499	pCi/g	08/13/18 13:36	09/03/18 21:42	1
Potassium-40	11.4		1.76	2.11		0.294	pCi/g	08/13/18 13:36	09/03/18 21:42	1
Protactinium-231	0.319	U	1.77	1.77		2.74	pCi/g	08/13/18 13:36	09/03/18 21:42	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30101-2

Client Sample ID: PE2-RSYB1-DC-S011

Lab Sample ID: 160-30101-11

Date Collected: 08/02/18 12:35

Matrix: Solid

Date Received: 08/10/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Radium-226	0.662		0.144	0.159	0.700	0.0334	pCi/g	08/13/18 13:36	09/03/18 21:42	1
Radium-228	0.708		0.225	0.237		0.138	pCi/g	08/13/18 13:36	09/03/18 21:42	1
Thallium-208	0.261		0.0720	0.0770		0.0237	pCi/g	08/13/18 13:36	09/03/18 21:42	1
Thorium-228	0.650		0.116	0.143		0.0529	pCi/g	08/13/18 13:36	09/03/18 21:42	1
Thorium-232	0.708		0.225	0.237		0.138	pCi/g	08/13/18 13:36	09/03/18 21:42	1
Thorium-234	1.21		1.21	1.22		0.936	pCi/g	08/13/18 13:36	09/03/18 21:42	1
Uranium-235	0.0104	U	0.0424	0.0424		0.609	pCi/g	08/13/18 13:36	09/03/18 21:42	1
Uranium-238	1.21		1.21	1.22		0.936	pCi/g	08/13/18 13:36	09/03/18 21:42	1

Client Sample ID: PE2-RSYB1-DC-S012

Lab Sample ID: 160-30101-12

Date Collected: 08/02/18 12:39

Matrix: Solid

Date Received: 08/10/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.653		0.190	0.201		0.0993	pCi/g	08/13/18 13:36	09/03/18 21:59	1
Actinium-227	-0.364	U	0.685	0.687		0.600	pCi/g	08/13/18 13:36	09/03/18 21:59	1
Bismuth-212	0.420	U	0.658	0.659		0.509	pCi/g	08/13/18 13:36	09/03/18 21:59	1
Bismuth-214	0.639		0.127	0.144		0.0457	pCi/g	08/13/18 13:36	09/03/18 21:59	1
Cesium-137	0.0305	U	0.0644	0.0645	0.0700	0.0511	pCi/g	08/13/18 13:36	09/03/18 21:59	1
Cobalt-60	0.0363		0.0242	0.0245	0.200	0.00870	pCi/g	08/13/18 13:36	09/03/18 21:59	1
Lead-210	0.531	U	1.45	1.45		1.17	pCi/g	08/13/18 13:36	09/03/18 21:59	1
Lead-212	0.756		0.0938	0.136		0.0312	pCi/g	08/13/18 13:36	09/03/18 21:59	1
Lead-214	0.616		0.104	0.122		0.0472	pCi/g	08/13/18 13:36	09/03/18 21:59	1
Potassium-40	13.9		1.47	2.05		0.234	pCi/g	08/13/18 13:36	09/03/18 21:59	1
Protactinium-231	0.342	U	1.32	1.32		2.05	pCi/g	08/13/18 13:36	09/03/18 21:59	1
Radium-226	0.639		0.127	0.144	0.700	0.0457	pCi/g	08/13/18 13:36	09/03/18 21:59	1
Radium-228	0.653		0.190	0.201		0.0993	pCi/g	08/13/18 13:36	09/03/18 21:59	1
Thallium-208	0.291		0.0603	0.0674		0.0164	pCi/g	08/13/18 13:36	09/03/18 21:59	1
Thorium-228	0.756		0.0938	0.136		0.0312	pCi/g	08/13/18 13:36	09/03/18 21:59	1
Thorium-232	0.653		0.190	0.201		0.0993	pCi/g	08/13/18 13:36	09/03/18 21:59	1
Thorium-234	-0.505	U	1.43	1.43		1.16	pCi/g	08/13/18 13:36	09/03/18 21:59	1
Uranium-235	-0.186	U	0.289	0.289		0.480	pCi/g	08/13/18 13:36	09/03/18 21:59	1
Uranium-238	-0.505	U	1.43	1.43		1.16	pCi/g	08/13/18 13:36	09/03/18 21:59	1

Client Sample ID: PE2-RSYB1-DC-S013

Lab Sample ID: 160-30101-13

Date Collected: 08/02/18 12:43

Matrix: Solid

Date Received: 08/10/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	1.02		0.238	0.260		0.0700	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Actinium-227	0.0724	U	0.147	0.147		0.849	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Bismuth-212	0.0767	U	0.975	0.975		0.796	pCi/g	08/13/18 13:36	09/03/18 22:00	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30101-2

Client Sample ID: PE2-RSYB1-DC-S013

Lab Sample ID: 160-30101-13

Date Collected: 08/02/18 12:43

Matrix: Solid

Date Received: 08/10/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Bismuth-214	0.862		0.219	0.236		0.0666	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Cesium-137	-0.0318	U	0.0833	0.0833	0.0700	0.0659	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Cobalt-60	0.0262	U	0.0720	0.0720	0.200	0.0335	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Lead-210	1.04	U	1.92	1.92		1.28	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Lead-212	0.765		0.129	0.152		0.0560	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Lead-214	0.788		0.179	0.196		0.0664	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Potassium-40	12.1		1.71	2.10		0.142	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Protactinium-231	0.475	U	1.98	1.98		3.08	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Radium-226	0.862		0.219	0.236	0.700	0.0666	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Radium-228	1.02		0.238	0.260		0.0700	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Thallium-208	0.409		0.0839	0.0936		0.0206	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Thorium-228	0.765		0.129	0.152		0.0560	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Thorium-232	1.02		0.238	0.260		0.0700	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Thorium-234	-0.629	U	1.91	1.91		1.59	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Uranium-235	-0.219	U	0.670	0.670		0.545	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Uranium-238	-0.629	U	1.91	1.91		1.59	pCi/g	08/13/18 13:36	09/03/18 22:00	1

Client Sample ID: PE2-RSYB1-DC-S014

Lab Sample ID: 160-30101-14

Date Collected: 08/02/18 12:47

Matrix: Solid

Date Received: 08/10/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.617		0.234	0.242		0.0669	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Actinium-227	-0.0998	U	1.01	1.01		0.829	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Bismuth-212	0.0477	U	1.06	1.06		0.869	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Bismuth-214	0.665		0.175	0.187		0.0630	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Cesium-137	-0.0189	U	0.0890	0.0891	0.0700	0.0717	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Cobalt-60	-0.0784	U	0.107	0.107	0.200	0.0736	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Lead-210	0.974	U	1.67	1.68		1.19	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Lead-212	0.554		0.118	0.131		0.0563	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Lead-214	0.517		0.145	0.154		0.0661	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Potassium-40	10.9		1.79	2.10		0.440	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Protactinium-231	0.959	U	2.61	2.61		2.86	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Radium-226	0.665		0.175	0.187	0.700	0.0630	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Radium-228	0.617		0.234	0.242		0.0669	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Thallium-208	0.230		0.0680	0.0719		0.0210	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Thorium-228	0.554		0.118	0.131		0.0563	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Thorium-232	0.617		0.234	0.242		0.0669	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Thorium-234	-0.594	U	1.77	1.77		1.20	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Uranium-235	-0.0522	U	0.0871	0.0873		0.630	pCi/g	08/13/18 13:36	09/03/18 22:00	1
Uranium-238	-0.594	U	1.77	1.77		1.20	pCi/g	08/13/18 13:36	09/03/18 22:00	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30101-2

Client Sample ID: PE2-RSYB1-DC-S015

Lab Sample ID: 160-30101-15

Date Collected: 08/02/18 12:51

Matrix: Solid

Date Received: 08/10/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.718		0.305	0.314		0.102	pCi/g	08/13/18 13:36	09/03/18 22:20	1
Actinium-227	-0.250	U	0.918	0.918		0.624	pCi/g	08/13/18 13:36	09/03/18 22:20	1
Bismuth-212	0.000	U	0.796	0.796		0.890	pCi/g	08/13/18 13:36	09/03/18 22:20	1
Bismuth-214	0.799		0.182	0.200		0.0378	pCi/g	08/13/18 13:36	09/03/18 22:20	1
Cesium-137	0.0106	U	0.0960	0.0960	0.0700	0.0779	pCi/g	08/13/18 13:36	09/03/18 22:20	1
Cobalt-60	-0.0135	U	0.122	0.122	0.200	0.0617	pCi/g	08/13/18 13:36	09/03/18 22:20	1
Lead-210	0.685	U	1.72	1.72		1.18	pCi/g	08/13/18 13:36	09/03/18 22:20	1
Lead-212	0.636		0.124	0.148		0.0512	pCi/g	08/13/18 13:36	09/03/18 22:20	1
Lead-214	0.659		0.171	0.184		0.0703	pCi/g	08/13/18 13:36	09/03/18 22:20	1
Potassium-40	13.5		2.63	2.97		0.858	pCi/g	08/13/18 13:36	09/03/18 22:20	1
Protactinium-231	0.776	U	2.45	2.45		2.69	pCi/g	08/13/18 13:36	09/03/18 22:20	1
Radium-226	0.799		0.182	0.200	0.700	0.0378	pCi/g	08/13/18 13:36	09/03/18 22:20	1
Radium-228	0.718		0.305	0.314		0.102	pCi/g	08/13/18 13:36	09/03/18 22:20	1
Thallium-208	0.264		0.0712	0.0763		0.0112	pCi/g	08/13/18 13:36	09/03/18 22:20	1
Thorium-228	0.636		0.124	0.148		0.0512	pCi/g	08/13/18 13:36	09/03/18 22:20	1
Thorium-232	0.718		0.305	0.314		0.102	pCi/g	08/13/18 13:36	09/03/18 22:20	1
Thorium-234	2.22		1.55	1.57		0.883	pCi/g	08/13/18 13:36	09/03/18 22:20	1
Uranium-235	0.0933	U	0.205	0.205		0.381	pCi/g	08/13/18 13:36	09/03/18 22:20	1
Uranium-238	2.22		1.55	1.57		0.883	pCi/g	08/13/18 13:36	09/03/18 22:20	1

Client Sample ID: PE2-RSYB1-DC-S016

Lab Sample ID: 160-30101-16

Date Collected: 08/02/18 12:55

Matrix: Solid

Date Received: 08/10/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.940		0.203	0.225		0.0678	pCi/g	08/13/18 13:36	09/03/18 22:19	1
Actinium-227	-0.262	U	1.07	1.07		0.661	pCi/g	08/13/18 13:36	09/03/18 22:19	1
Bismuth-212	0.320	U	0.913	0.914		0.723	pCi/g	08/13/18 13:36	09/03/18 22:19	1
Bismuth-214	0.764		0.150	0.170		0.0320	pCi/g	08/13/18 13:36	09/03/18 22:19	1
Cesium-137	-0.00377	U	0.0994	0.0994	0.0700	0.0819	pCi/g	08/13/18 13:36	09/03/18 22:19	1
Cobalt-60	0.0201	U	0.0747	0.0747	0.200	0.0414	pCi/g	08/13/18 13:36	09/03/18 22:19	1
Lead-210	0.0632	U	2.27	2.27		1.87	pCi/g	08/13/18 13:36	09/03/18 22:19	1
Lead-212	0.856		0.125	0.167		0.0509	pCi/g	08/13/18 13:36	09/03/18 22:19	1
Lead-214	0.656		0.129	0.146		0.0649	pCi/g	08/13/18 13:36	09/03/18 22:19	1
Potassium-40	14.2		1.91	2.40		0.282	pCi/g	08/13/18 13:36	09/03/18 22:19	1
Protactinium-231	0.000	U	1.02	1.02		2.76	pCi/g	08/13/18 13:36	09/03/18 22:19	1
Radium-226	0.764		0.150	0.170	0.700	0.0320	pCi/g	08/13/18 13:36	09/03/18 22:19	1
Radium-228	0.940		0.203	0.225		0.0678	pCi/g	08/13/18 13:36	09/03/18 22:19	1
Thallium-208	0.340		0.0801	0.0875		0.0240	pCi/g	08/13/18 13:36	09/03/18 22:19	1
Thorium-228	0.856		0.125	0.167		0.0509	pCi/g	08/13/18 13:36	09/03/18 22:19	1
Thorium-232	0.940		0.203	0.225		0.0678	pCi/g	08/13/18 13:36	09/03/18 22:19	1
Thorium-234	-1.81	U	1.66	1.68		1.59	pCi/g	08/13/18 13:36	09/03/18 22:19	1
Uranium-235	-0.0148	U	0.148	0.148		0.563	pCi/g	08/13/18 13:36	09/03/18 22:19	1
Uranium-238	-1.81	U	1.66	1.68		1.59	pCi/g	08/13/18 13:36	09/03/18 22:19	1

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30101-2

Client Sample ID: PE2-RSYB1-DC-S017

Lab Sample ID: 160-30101-17

Date Collected: 08/02/18 12:59

Matrix: Solid

Date Received: 08/10/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.555		0.183	0.191		0.0350	pCi/g	08/13/18 13:36	09/03/18 22:21	1
Actinium-227	0.0393	U	0.689	0.689		0.475	pCi/g	08/13/18 13:36	09/03/18 22:21	1
Bismuth-212	0.0482	U	0.725	0.725		0.592	pCi/g	08/13/18 13:36	09/03/18 22:21	1
Bismuth-214	0.454		0.139	0.147		0.0582	pCi/g	08/13/18 13:36	09/03/18 22:21	1
Cesium-137	-0.0526	U	0.0805	0.0807	0.0700	0.0765	pCi/g	08/13/18 13:36	09/03/18 22:21	1
Cobalt-60	-0.0218	U	0.0911	0.0912	0.200	0.0452	pCi/g	08/13/18 13:36	09/03/18 22:21	1
Lead-210	1.75		1.29	1.31		0.791	pCi/g	08/13/18 13:36	09/03/18 22:21	1
Lead-212	0.415		0.105	0.118		0.0598	pCi/g	08/13/18 13:36	09/03/18 22:21	1
Lead-214	0.507		0.123	0.134		0.0507	pCi/g	08/13/18 13:36	09/03/18 22:21	1
Potassium-40	10.4		1.62	1.94		0.271	pCi/g	08/13/18 13:36	09/03/18 22:21	1
Protactinium-231	0.000	U	0.308	0.308		2.06	pCi/g	08/13/18 13:36	09/03/18 22:21	1
Radium-226	0.454		0.139	0.147	0.700	0.0582	pCi/g	08/13/18 13:36	09/03/18 22:21	1
Radium-228	0.555		0.183	0.191		0.0350	pCi/g	08/13/18 13:36	09/03/18 22:21	1
Thallium-208	0.229		0.0730	0.0768		0.0273	pCi/g	08/13/18 13:36	09/03/18 22:21	1
Thorium-228	0.415		0.105	0.118		0.0598	pCi/g	08/13/18 13:36	09/03/18 22:21	1
Thorium-232	0.555		0.183	0.191		0.0350	pCi/g	08/13/18 13:36	09/03/18 22:21	1
Thorium-234	0.273	U	0.381	0.382		0.887	pCi/g	08/13/18 13:36	09/03/18 22:21	1
Uranium-235	0.0969	U	0.282	0.282		0.284	pCi/g	08/13/18 13:36	09/03/18 22:21	1
Uranium-238	0.273	U	0.381	0.382		0.887	pCi/g	08/13/18 13:36	09/03/18 22:21	1

Client Sample ID: PE2-RSYB1-DC-S018

Lab Sample ID: 160-30101-18

Date Collected: 08/02/18 13:02

Matrix: Solid

Date Received: 08/10/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.762		0.285	0.296		0.104	pCi/g	08/13/18 13:36	09/03/18 22:32	1
Actinium-227	0.757		0.679	0.685		0.420	pCi/g	08/13/18 13:36	09/03/18 22:32	1
Bismuth-212	0.343	U	0.569	0.570		0.420	pCi/g	08/13/18 13:36	09/03/18 22:32	1
Bismuth-214	0.734		0.153	0.171		0.0322	pCi/g	08/13/18 13:36	09/03/18 22:32	1
Cesium-137	-0.00317	U	0.0803	0.0803	0.0700	0.0659	pCi/g	08/13/18 13:36	09/03/18 22:32	1
Cobalt-60	-0.0308	U	0.124	0.124	0.200	0.0602	pCi/g	08/13/18 13:36	09/03/18 22:32	1
Lead-210	-0.890	U	2.28	2.28		1.91	pCi/g	08/13/18 13:36	09/03/18 22:32	1
Lead-212	0.667		0.125	0.143		0.0657	pCi/g	08/13/18 13:36	09/03/18 22:32	1
Lead-214	0.894		0.162	0.186		0.0553	pCi/g	08/13/18 13:36	09/03/18 22:32	1
Potassium-40	15.8		1.99	2.55		0.312	pCi/g	08/13/18 13:36	09/03/18 22:32	1
Protactinium-231	-0.0588	U	3.43	3.43		2.82	pCi/g	08/13/18 13:36	09/03/18 22:32	1
Radium-226	0.734		0.153	0.171	0.700	0.0322	pCi/g	08/13/18 13:36	09/03/18 22:32	1
Radium-228	0.762		0.285	0.296		0.104	pCi/g	08/13/18 13:36	09/03/18 22:32	1
Thallium-208	0.277		0.0766	0.0816		0.0281	pCi/g	08/13/18 13:36	09/03/18 22:32	1
Thorium-228	0.667		0.125	0.143		0.0657	pCi/g	08/13/18 13:36	09/03/18 22:32	1
Thorium-232	0.762		0.285	0.296		0.104	pCi/g	08/13/18 13:36	09/03/18 22:32	1
Thorium-234	-0.0464	U	2.08	2.08		1.71	pCi/g	08/13/18 13:36	09/03/18 22:32	1
Uranium-235	0.117	U	0.236	0.236		0.569	pCi/g	08/13/18 13:36	09/03/18 22:32	1
Uranium-238	-0.0464	U	2.08	2.08		1.71	pCi/g	08/13/18 13:36	09/03/18 22:32	1

QC Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30101-2

Method: 905.0 - Total Beta Strontium (GFPC)

Lab Sample ID: MB 160-382925/11-A

Matrix: Solid

Analysis Batch: 387161

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 382925

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Total Beta Strontium	-0.01525	U	0.0722	0.0722	0.331	0.0607	pCi/g	08/16/18 12:28	09/05/18 05:46	1

Carrier	MB %Yield	MB Qualifier	Limits	Prepared	Analyzed	Dil Fac
Sr Carrier	70.7		40 - 110	08/16/18 12:28	09/05/18 05:46	1

Lab Sample ID: LCS 160-382925/1-A

Matrix: Solid

Analysis Batch: 387161

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 382925

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits
Total Beta Strontium	8.20	8.112		0.699	0.331	0.0764	pCi/g	99	75 - 125

Carrier	LCS %Yield	LCS Qualifier	Limits
Sr Carrier	55.1		40 - 110

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-382045/1-A

Matrix: Solid

Analysis Batch: 386845

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 382045

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	-0.02508	U	0.178	0.178		0.0924	pCi/g	08/13/18 13:36	09/03/18 16:19	1
Actinium-227	0.09423	U	0.196	0.196		0.317	pCi/g	08/13/18 13:36	09/03/18 16:19	1
Bismuth-212	0.0000	U	0.256	0.256		0.366	pCi/g	08/13/18 13:36	09/03/18 16:19	1
Bismuth-214	0.005720	U	0.00593	0.00596		0.152	pCi/g	08/13/18 13:36	09/03/18 16:19	1
Cesium-137	0.01799	U	0.0332	0.0333	0.0700	0.0242	pCi/g	08/13/18 13:36	09/03/18 16:19	1
Cobalt-60	0.02529		0.0156	0.0158	0.200	0.0114	pCi/g	08/13/18 13:36	09/03/18 16:19	1
Lead-210	0.2719	U	0.646	0.647		0.497	pCi/g	08/13/18 13:36	09/03/18 16:19	1
Lead-212	-0.02080	U	0.0934	0.0934		0.0597	pCi/g	08/13/18 13:36	09/03/18 16:19	1
Lead-214	-0.001918	U	0.0791	0.0792		0.0646	pCi/g	08/13/18 13:36	09/03/18 16:19	1
Potassium-40	0.04379	U	0.390	0.390		0.308	pCi/g	08/13/18 13:36	09/03/18 16:19	1
Protactinium-231	0.0000	U	0.478	0.478		1.58	pCi/g	08/13/18 13:36	09/03/18 16:19	1
Radium-226	0.005720	U	0.00593	0.00596	0.700	0.152	pCi/g	08/13/18 13:36	09/03/18 16:19	1
Radium-228	-0.02508	U	0.178	0.178		0.0924	pCi/g	08/13/18 13:36	09/03/18 16:19	1
Thallium-208	0.02812		0.0254	0.0255		0.0138	pCi/g	08/13/18 13:36	09/03/18 16:19	1
Thorium-228	-0.02080	U	0.0934	0.0934		0.0597	pCi/g	08/13/18 13:36	09/03/18 16:19	1
Thorium-232	-0.02508	U	0.178	0.178		0.0924	pCi/g	08/13/18 13:36	09/03/18 16:19	1
Thorium-234	-0.1324	U	0.937	0.937		0.764	pCi/g	08/13/18 13:36	09/03/18 16:19	1
Uranium-235	-0.002364	U	0.166	0.166		0.310	pCi/g	08/13/18 13:36	09/03/18 16:19	1
Uranium-238	-0.1324	U	0.937	0.937		0.764	pCi/g	08/13/18 13:36	09/03/18 16:19	1

QC Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30101-2

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS) (Continued)

Lab Sample ID: LCS 160-382045/2-A

Matrix: Solid

Analysis Batch: 386843

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 382045

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits
Americium-241	96.8	97.77		10.3		0.631	pCi/g	101	87 - 116
Cesium-137	28.2	28.05		3.03	0.0700	0.133	pCi/g	100	87 - 120
Cobalt-60	12.8	12.89		1.37	0.200	0.0186	pCi/g	101	87 - 115

Lab Sample ID: 160-30101-1 DU

Matrix: Solid

Analysis Batch: 386842

Client Sample ID: PE2-RSYB1-DC-S001

Prep Type: Total/NA

Prep Batch: 382045

Analyte	Sample Result	Sample Qual	DU Result	DU Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	RER	RER Limit
Actinium 228	0.898		0.8562		0.221		0.0595	pCi/g	0.09	1
Actinium-227	0.302	U	-0.04043	U	0.877		0.721	pCi/g	0.25	1
Bismuth-212	0.178	U	-0.00169	U	1.11		0.365	pCi/g	0.07	1
Bismuth-214	0.676		0.7439		0.167		0.0320	pCi/g	0.19	1
Cesium-137	-0.0214	U	-0.07460	U	0.0910	0.0700	0.0732	pCi/g	0.27	1
Cobalt-60	0.000104	U	0.01293	U	0.0581	0.200	0.0528	pCi/g	0.22	1
Lead-210	0.571	U	0.7222	U	1.43		1.13	pCi/g	0.05	1
Lead-212	0.738		0.7232		0.150		0.0504	pCi/g	0.05	1
Lead-214	0.716		0.6155		0.141		0.0509	pCi/g	0.30	1
Potassium-40	14.7		13.50		2.32		0.282	pCi/g	0.25	1
Protactinium-231	0.763	U	0.3347	U	1.72		2.67	pCi/g	0.11	1
Radium-226	0.676		0.7439		0.167	0.700	0.0320	pCi/g	0.19	1
Radium-228	0.898		0.8562		0.221		0.0595	pCi/g	0.09	1
Thallium-208	0.253		0.2600		0.0772		0.0258	pCi/g	0.04	1
Thorium-228	0.738		0.7232		0.150		0.0504	pCi/g	0.05	1
Thorium-232	0.898		0.8562		0.221		0.0595	pCi/g	0.09	1
Thorium-234	1.37		1.307		1.02		0.754	pCi/g	0.03	1
Uranium-235	0.124	U	0.1698	U	0.199		0.459	pCi/g	0.08	1
Uranium-238	1.37		1.307		1.02		0.754	pCi/g	0.03	1

QC Association Summary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30101-2

Rad

Leach Batch: 381616

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-30101-1	PE2-RSYB1-DC-S001	Total/NA	Solid	Dry and Grind	
160-30101-2	PE2-RSYB1-DC-S002	Total/NA	Solid	Dry and Grind	
160-30101-3	PE2-RSYB1-DC-S003	Total/NA	Solid	Dry and Grind	
160-30101-4	PE2-RSYB1-DC-S004	Total/NA	Solid	Dry and Grind	
160-30101-5	PE2-RSYB1-DC-S005	Total/NA	Solid	Dry and Grind	
160-30101-6	PE2-RSYB1-DC-S006	Total/NA	Solid	Dry and Grind	
160-30101-7	PE2-RSYB1-DC-S007	Total/NA	Solid	Dry and Grind	
160-30101-8	PE2-RSYB1-DC-S008	Total/NA	Solid	Dry and Grind	
160-30101-9	PE2-RSYB1-DC-S009	Total/NA	Solid	Dry and Grind	
160-30101-10	PE2-RSYB1-DC-S010	Total/NA	Solid	Dry and Grind	
160-30101-11	PE2-RSYB1-DC-S011	Total/NA	Solid	Dry and Grind	
160-30101-12	PE2-RSYB1-DC-S012	Total/NA	Solid	Dry and Grind	
160-30101-13	PE2-RSYB1-DC-S013	Total/NA	Solid	Dry and Grind	
160-30101-14	PE2-RSYB1-DC-S014	Total/NA	Solid	Dry and Grind	
160-30101-15	PE2-RSYB1-DC-S015	Total/NA	Solid	Dry and Grind	
160-30101-16	PE2-RSYB1-DC-S016	Total/NA	Solid	Dry and Grind	
160-30101-17	PE2-RSYB1-DC-S017	Total/NA	Solid	Dry and Grind	
160-30101-18	PE2-RSYB1-DC-S018	Total/NA	Solid	Dry and Grind	
160-30101-1 DU	PE2-RSYB1-DC-S001	Total/NA	Solid	Dry and Grind	

Prep Batch: 382045

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-30101-1	PE2-RSYB1-DC-S001	Total/NA	Solid	Fill_Geo-21	381616
160-30101-2	PE2-RSYB1-DC-S002	Total/NA	Solid	Fill_Geo-21	381616
160-30101-3	PE2-RSYB1-DC-S003	Total/NA	Solid	Fill_Geo-21	381616
160-30101-4	PE2-RSYB1-DC-S004	Total/NA	Solid	Fill_Geo-21	381616
160-30101-5	PE2-RSYB1-DC-S005	Total/NA	Solid	Fill_Geo-21	381616
160-30101-6	PE2-RSYB1-DC-S006	Total/NA	Solid	Fill_Geo-21	381616
160-30101-7	PE2-RSYB1-DC-S007	Total/NA	Solid	Fill_Geo-21	381616
160-30101-8	PE2-RSYB1-DC-S008	Total/NA	Solid	Fill_Geo-21	381616
160-30101-9	PE2-RSYB1-DC-S009	Total/NA	Solid	Fill_Geo-21	381616
160-30101-10	PE2-RSYB1-DC-S010	Total/NA	Solid	Fill_Geo-21	381616
160-30101-11	PE2-RSYB1-DC-S011	Total/NA	Solid	Fill_Geo-21	381616
160-30101-12	PE2-RSYB1-DC-S012	Total/NA	Solid	Fill_Geo-21	381616
160-30101-13	PE2-RSYB1-DC-S013	Total/NA	Solid	Fill_Geo-21	381616
160-30101-14	PE2-RSYB1-DC-S014	Total/NA	Solid	Fill_Geo-21	381616
160-30101-15	PE2-RSYB1-DC-S015	Total/NA	Solid	Fill_Geo-21	381616
160-30101-16	PE2-RSYB1-DC-S016	Total/NA	Solid	Fill_Geo-21	381616
160-30101-17	PE2-RSYB1-DC-S017	Total/NA	Solid	Fill_Geo-21	381616
160-30101-18	PE2-RSYB1-DC-S018	Total/NA	Solid	Fill_Geo-21	381616
MB 160-382045/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-382045/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	
160-30101-1 DU	PE2-RSYB1-DC-S001	Total/NA	Solid	Fill_Geo-21	381616

Prep Batch: 382925

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-30101-1	PE2-RSYB1-DC-S001	Total/NA	Solid	DPS-0	381616
160-30101-11	PE2-RSYB1-DC-S011	Total/NA	Solid	DPS-0	381616
MB 160-382925/11-A	Method Blank	Total/NA	Solid	DPS-0	
LCS 160-382925/1-A	Lab Control Sample	Total/NA	Solid	DPS-0	

Tracer/Carrier Summary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30101-2

Method: 905.0 - Total Beta Strontium (GFPC)

Matrix: Solid

Prep Type: Total/NA

		Percent Yield (Acceptance Limits)						
		Sr Carrier						
Lab Sample ID	Client Sample ID	(40-110)						
160-30101-1	PE2-RSYB1-DC-S001	78.8						
160-30101-11	PE2-RSYB1-DC-S011	73.3						
LCS 160-382925/1-A	Lab Control Sample	55.1						
MB 160-382925/11-A	Method Blank	70.7						

Tracer/Carrier Legend

Sr Carrier = Sr Carrier

TestAmerica

THE LEADER IN ENVIRONMENTAL TESTING

ANALYTICAL REPORT

TestAmerica Laboratories, Inc.

TestAmerica St. Louis
13715 Rider Trail North
Earth City, MO 63045
Tel: (314)298-8566

TestAmerica Job ID: 160-30102-2

Client Project/Site: Hunters Point Naval Shipyard - Parcel E2

For:

Aptim Federal Services LLC
4005 Port Chicago Hwy, Suite 200
Concord, California 94520

Attn: Eddie Kalombo

Rhonda Ridenhower

Authorized for release by:

9/6/2018 9:26:48 AM

Rhonda Ridenhower, Manager of Project Management
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This report has been electronically signed and authorized by the signatory. Electronic signature is intended to be the legally binding equivalent of a traditionally handwritten signature.

Results relate only to the items tested and the sample(s) as received by the laboratory.

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Case Narrative

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30102-2

Job ID: 160-30102-2

Laboratory: TestAmerica St. Louis

Narrative

CASE NARRATIVE

Client: Aptim Federal Services LLC

Project: Hunters Point Naval Shipyard - Parcel E2

Report Number: 160-30102-2

With the exceptions noted as flags or footnotes, standard analytical protocols were followed in the analysis of the samples and no problems were encountered or anomalies observed. In addition all laboratory quality control samples were within established control limits, with any exceptions noted below. Each sample was analyzed to achieve the lowest possible reporting limit within the constraints of the method. In some cases, due to interference or analytes present at high concentrations, samples were diluted. For diluted samples, the reporting limits are adjusted relative to the dilution required.

TestAmerica St. Louis attests to the validity of the laboratory data generated by TestAmerica facilities reported herein. All analyses performed by TestAmerica facilities were done using established laboratory SOPs that incorporate QA/QC procedures described in the application methods. TestAmerica's operations groups have reviewed the data for compliance with the laboratory QA/QC plan, and data have been found to be compliant with laboratory protocols unless otherwise noted below.

The test results in this report meet all NELAP requirements for parameters for which accreditation is required or available. Any exceptions to NELAP requirements are noted in this report. Pursuant to NELAP, this report may not be reproduced, except in full, without the written approval of the laboratory.

Calculations are performed before rounding to avoid round-off errors in calculated results.

All holding times were met and proper preservation noted for the methods performed on these samples, unless otherwise detailed in the individual sections below.

All solid sample results for Chemistry analyses are reported on an "as received" basis unless otherwise indicated by the presence of a % solids value in the method header. All soil/sediment sample results for radiochemistry analyses are based upon sample as dried and disaggregated with the exception of tritium, carbon-14, and iodine-129 by gamma spectroscopy unless requested as wet weight by the client."

Any minimum detectable concentration (MDC), critical value (DLC), or Safe Drinking Water Act detection limit (SDWA DL) is sample-specific unless otherwise stated elsewhere in this narrative.

Reference the chain of custody and condition upon receipt report for any variations on receipt conditions and temperature of samples on receipt.

Manual Integrations were performed only when necessary and are in compliance with the laboratory's standard operating procedure. Detailed information can be found in the raw data section of the level IV report.

The following clean-up methods for Organic analyses may have been used on the samples in this data set. Specific methods employed are documented on the batch extraction logs:

Method 3600C: Cleanup
Method 3620C: Florisil Cleanup
Method 3630C: Silica Gel Cleanup
Method 3640A: Gel-Permeation Cleanup
Method 3650B: Acid-Base Partition Cleanup
Method 3660B: Sulfur Cleanup

Case Narrative

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30102-2

Job ID: 160-30102-2 (Continued)

Laboratory: TestAmerica St. Louis (Continued)

Method 3665A: Sulfuric Acid/Permanganate Cleanup

This laboratory report is confidential and is intended for the sole use of TestAmerica and its client.

RECEIPT

The samples were received on 08/10/2018; the samples arrived in good condition, properly preserved. The temperature of the coolers at receipt was 20.0 C.

RADIUM-226 BY GAMMA SPEC (21 DAY INGROWTH)

Sample PE2-RSYB1-DC-B-S001 (160-30102-1) was analyzed for Radium-226 by gamma spec (21 day ingrowth) in accordance with EPA GA_01_R. The samples were dried on 08/10/2018, prepared on 08/13/2018 and analyzed on 09/03/2018.

The cesium-137 detection goal of 0.0700 pCi/g was not met. This is caused by statistical fluctuations in the Compton background due to low level activity in the samples in conjunction with the software attempting to fit a peak into the noise of this baseline.

The following sample exhibited a negative result greater in magnitude than the 3 sigma TPU: (MB 160-382055/1-A). This occurrence was evaluated and determined to be random in nature. Sporadic occurrences such as this are statistically expected. No further action is required.

No additional analytical or quality issues were noted, other than those described above or in the Definitions/Glossary page.

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Login Sample Receipt Checklist

Client: Aptim Federal Services LLC

Job Number: 160-30102-2

Login Number: 30102**List Source: TestAmerica St. Louis****List Number: 1****Creator: Press, Nicholas B**

Question	Answer	Comment
Radioactivity wasn't checked or is </= background as measured by a survey meter.	True	
The cooler's custody seal, if present, is intact.	True	
Sample custody seals, if present, are intact.	True	
The cooler or samples do not appear to have been compromised or tampered with.	True	
Samples were received on ice.	N/A	
Cooler Temperature is acceptable.	True	
Cooler Temperature is recorded.	True	
COC is present.	True	
COC is filled out in ink and legible.	True	
COC is filled out with all pertinent information.	True	
Is the Field Sampler's name present on COC?	True	
There are no discrepancies between the containers received and the COC.	True	
Samples are received within Holding Time (excluding tests with immediate HTs)	True	
Sample containers have legible labels.	True	
Containers are not broken or leaking.	True	
Sample collection date/times are provided.	True	
Appropriate sample containers are used.	True	
Sample bottles are completely filled.	True	
Sample Preservation Verified.	N/A	
There is sufficient vol. for all requested analyses, incl. any requested MS/MSDs	True	
Containers requiring zero headspace have no headspace or bubble is <6mm (1/4").	N/A	
Multiphasic samples are not present.	True	
Samples do not require splitting or compositing.	True	
Residual Chlorine Checked.	N/A	

Definitions/Glossary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30102-2

Qualifiers

Rad

Qualifier	Qualifier Description
U	Undetected at the Limit of Detection.

Glossary

Abbreviation	These commonly used abbreviations may or may not be present in this report.
α	Listed under the "D" column to designate that the result is reported on a dry weight basis
%R	Percent Recovery
CFL	Contains Free Liquid
CNF	Contains No Free Liquid
DER	Duplicate Error Ratio (normalized absolute difference)
Dil Fac	Dilution Factor
DL	Detection Limit (DoD/DOE)
DL, RA, RE, IN	Indicates a Dilution, Re-analysis, Re-extraction, or additional Initial metals/anion analysis of the sample
DLC	Decision Level Concentration (Radiochemistry)
EDL	Estimated Detection Limit (Dioxin)
LOD	Limit of Detection (DoD/DOE)
LOQ	Limit of Quantitation (DoD/DOE)
MDA	Minimum Detectable Activity (Radiochemistry)
MDC	Minimum Detectable Concentration (Radiochemistry)
MDL	Method Detection Limit
ML	Minimum Level (Dioxin)
NC	Not Calculated
ND	Not Detected at the reporting limit (or MDL or EDL if shown)
PQL	Practical Quantitation Limit
QC	Quality Control
RER	Relative Error Ratio (Radiochemistry)
RL	Reporting Limit or Requested Limit (Radiochemistry)
RPD	Relative Percent Difference, a measure of the relative difference between two points
TEF	Toxicity Equivalent Factor (Dioxin)
TEQ	Toxicity Equivalent Quotient (Dioxin)

Method Summary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30102-2

Method	Method Description	Protocol	Laboratory
GA-01-R	Radium-226 & Other Gamma Emitters (GS)	DOE	TAL SL
Dry and Grind	Preparation, Dry and Grind	None	TAL SL
Fill_Geo-21	Fill Geometry, 21-Day In-Growth	None	TAL SL

Protocol References:

DOE = U.S. Department of Energy
None = None

Laboratory References:

TAL SL = TestAmerica St. Louis, 13715 Rider Trail North, Earth City, MO 63045, TEL (314)298-8566

Sample Summary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30102-2

Lab Sample ID	Client Sample ID	Matrix	Collected	Received
160-30102-1	PE2-RSYB1-DC-B-S001	Solid	08/02/18 10:30	08/10/18 08:30

1
2
3
4
5
6
7
8
9
10
11

Client Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30102-2

Client Sample ID: PE2-RSYB1-DC-B-S001

Lab Sample ID: 160-30102-1

Date Collected: 08/02/18 10:30

Matrix: Solid

Date Received: 08/10/18 08:30

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Analyte	Result	Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.464		0.313	0.317		0.140	pCi/g	08/13/18 14:52	09/03/18 20:14	1
Actinium-227	0.392	U	0.973	0.974		0.786	pCi/g	08/13/18 14:52	09/03/18 20:14	1
Bismuth-212	2.25		0.678	0.716		0.117	pCi/g	08/13/18 14:52	09/03/18 20:14	1
Bismuth-214	0.613		0.176	0.187		0.0714	pCi/g	08/13/18 14:52	09/03/18 20:14	1
Cesium-137	-0.0651	U	0.113	0.113	0.0700	0.0889	pCi/g	08/13/18 14:52	09/03/18 20:14	1
Cobalt-60	0.0407		0.0323	0.0326	0.200	0.0139	pCi/g	08/13/18 14:52	09/03/18 20:14	1
Lead-210	0.822	U	1.51	1.51		1.18	pCi/g	08/13/18 14:52	09/03/18 20:14	1
Lead-212	0.646		0.120	0.137		0.0563	pCi/g	08/13/18 14:52	09/03/18 20:14	1
Lead-214	0.733		0.150	0.167		0.0631	pCi/g	08/13/18 14:52	09/03/18 20:14	1
Potassium-40	13.8		1.89	2.35		0.399	pCi/g	08/13/18 14:52	09/03/18 20:14	1
Protactinium-231	0.000	U	0.907	0.907		2.94	pCi/g	08/13/18 14:52	09/03/18 20:14	1
Radium-226	0.613		0.176	0.187	0.700	0.0714	pCi/g	08/13/18 14:52	09/03/18 20:14	1
Radium-228	0.464		0.313	0.317		0.140	pCi/g	08/13/18 14:52	09/03/18 20:14	1
Thallium-208	0.245		0.0837	0.0873		0.0339	pCi/g	08/13/18 14:52	09/03/18 20:14	1
Thorium-228	0.646		0.120	0.137		0.0563	pCi/g	08/13/18 14:52	09/03/18 20:14	1
Thorium-232	0.464		0.313	0.317		0.140	pCi/g	08/13/18 14:52	09/03/18 20:14	1
Thorium-234	0.566	U	0.483	0.487		1.66	pCi/g	08/13/18 14:52	09/03/18 20:14	1
Uranium-235	0.205	U	0.426	0.427		0.558	pCi/g	08/13/18 14:52	09/03/18 20:14	1
Uranium-238	0.566	U	0.483	0.487		1.66	pCi/g	08/13/18 14:52	09/03/18 20:14	1

QC Sample Results

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30102-2

Method: GA-01-R - Radium-226 & Other Gamma Emitters (GS)

Lab Sample ID: MB 160-382055/1-A

Matrix: Solid

Analysis Batch: 386842

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 382055

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Thorium-234	1.044		1.10	1.10		0.677	pCi/g	08/13/18 14:52	09/03/18 16:37	1
Uranium-238	1.044		1.10	1.10		0.677	pCi/g	08/13/18 14:52	09/03/18 16:37	1

Lab Sample ID: MB 160-382055/1-A

Matrix: Solid

Analysis Batch: 386858

Client Sample ID: Method Blank

Prep Type: Total/NA

Prep Batch: 382055

Analyte	MB Result	MB Qualifier	Count Uncert. (2σ+/-)	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	Prepared	Analyzed	Dil Fac
Actinium 228	0.09095		0.0743	0.0748		0.0292	pCi/g	08/13/18 14:52	09/04/18 07:53	1
Actinium-227	0.1280	U	0.359	0.359		0.282	pCi/g	08/13/18 14:52	09/04/18 07:53	1
Bismuth-212	0.0000	U	0.256	0.256		0.306	pCi/g	08/13/18 14:52	09/04/18 07:53	1
Bismuth-214	-0.004323	U	0.00532	0.00534		0.0868	pCi/g	08/13/18 14:52	09/04/18 07:53	1
Cesium-137	0.01799	U	0.0350	0.0350	0.0700	0.0258	pCi/g	08/13/18 14:52	09/04/18 07:53	1
Cobalt-60	-0.008186	U	0.0563	0.0563	0.200	0.0272	pCi/g	08/13/18 14:52	09/04/18 07:53	1
Lead-210	-0.5712	U	0.164	0.177		0.926	pCi/g	08/13/18 14:52	09/04/18 07:53	1
Lead-212	-0.05759	U	0.0663	0.0667		0.0697	pCi/g	08/13/18 14:52	09/04/18 07:53	1
Lead-214	-0.004869	U	0.0750	0.0750		0.0614	pCi/g	08/13/18 14:52	09/04/18 07:53	1
Potassium-40	0.01476	U	0.700	0.700		0.418	pCi/g	08/13/18 14:52	09/04/18 07:53	1
Protactinium-231	0.3603	U	2.39	2.39		1.96	pCi/g	08/13/18 14:52	09/04/18 07:53	1
Radium-226	-0.004323	U	0.00532	0.00534	0.700	0.0868	pCi/g	08/13/18 14:52	09/04/18 07:53	1
Radium-228	0.09095		0.0743	0.0748		0.0292	pCi/g	08/13/18 14:52	09/04/18 07:53	1
Thallium-208	0.03255		0.0387	0.0389		0.0207	pCi/g	08/13/18 14:52	09/04/18 07:53	1
Thorium-228	-0.05759	U	0.0663	0.0667		0.0697	pCi/g	08/13/18 14:52	09/04/18 07:53	1
Thorium-232	0.09095		0.0743	0.0748		0.0292	pCi/g	08/13/18 14:52	09/04/18 07:53	1
Uranium-235	0.05263	U	0.105	0.105		0.310	pCi/g	08/13/18 14:52	09/04/18 07:53	1

Lab Sample ID: LCS 160-382055/2-A

Matrix: Solid

Analysis Batch: 386843

Client Sample ID: Lab Control Sample

Prep Type: Total/NA

Prep Batch: 382055

Analyte	Spike Added	LCS Result	LCS Qual	Total Uncert. (2σ+/-)	LOQ	DLC	Unit	%Rec	%Rec. Limits
Americium-241	96.8	98.65		10.4		0.644	pCi/g	102	87 - 116
Cesium-137	28.2	28.30		3.05	0.0700	0.102	pCi/g	100	87 - 120
Cobalt-60	12.8	12.45		1.33	0.200	0.0186	pCi/g	97	87 - 115

QC Association Summary

Client: Aptim Federal Services LLC
Project/Site: Hunters Point Naval Shipyard - Parcel E2

TestAmerica Job ID: 160-30102-2

Rad

Leach Batch: 381621

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-30102-1	PE2-RSYB1-DC-B-S001	Total/NA	Solid	Dry and Grind	

Prep Batch: 382055

Lab Sample ID	Client Sample ID	Prep Type	Matrix	Method	Prep Batch
160-30102-1	PE2-RSYB1-DC-B-S001	Total/NA	Solid	Fill_Geo-21	381621
MB 160-382055/1-A	Method Blank	Total/NA	Solid	Fill_Geo-21	
LCS 160-382055/2-A	Lab Control Sample	Total/NA	Solid	Fill_Geo-21	